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*RI/FS Report*

# Remedial Investigation Report

Taylor Lumber and Treating Superfund Site  
Sheridan, Oregon

**Volume II**  
Appendixes B - E

Prepared for  
**U.S. EPA**

WA No. 225-RICO-10FI  
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Prepared by  
**CH2MHILL**

CVO\043620004

USEPA SF



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## Phase 2 Field Investigation

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This appendix contains information related to the tasks completed as part of the Phase 2 Field Investigation conducted in July – August 2002. Monitor well completion diagrams, geologic logs, survey information, and field notes are included (Attachments B1, B2, and B3). Analytical data are presented in Appendix A. Sampling and construction procedures are described in greater detail in the *Phase 2 Field Investigation Work Plan* (July 2002). Refer to figures in the Report for sample locations.

### Field Tasks

The completed field tasks were:

- New monitor well installation
- PVC monitor well replacement with stainless steel
- Geoprobe installation and subsequent groundwater and soil sampling around the barrier wall
- Geoprobe samples for TCLP analysis from the soil storage cells
- Surface soil sampling
- Ditch soil sampling
- River sediment sampling
- Background arsenic sampling
- Survey of well and sample locations

### New Monitor Wells

A total of seven (7) monitor wells were installed: four in the West Facility (MW-17S, MW-18S, MW-19S, and MW-20S) and three in the East Facility (MW-21S, MW-22S, and MW-23S). All boreholes were drilled with a 10-inch outside diameter (O.D.) [6.625-inch inside diameter (I.D.)] hollow stem auger. A 5-foot-long continuous core sampler was used to provide core samples for inspection. Ten foot screens were installed in each well, measured upward from the siltstone. Each well was completed with a 6-inch sump to serve as a silt trap. Well risers, screens, and sumps were 2-inch-I.D. schedule 40 polyvinyl chloride (PVC) with flush-threaded sections and 0.010-inch machine slots. 10-20 Colorado silica was used as the filter pack. All wells were above ground completions, with the exception of MW-17S, which was flush-mounted. Construction and geologic logs for each well are attached.

Drill cuttings were monitored with a PID, and soil that produced elevated readings was collected for analysis. One soil sample was obtained from MW-17S at the 4-5.5-foot depth interval due to elevated readings; no other samples were collected during the well construction. The sample was analyzed for total metals and SVOCs.

The newly installed monitor wells were developed and sampled during the 3<sup>rd</sup> Quarter Groundwater Monitoring Event in August 2002 (Attachment B4).

### **Monitor Well Replacement**

The existing 2-inch PVC monitor well, MW-101S, was replaced with a 4-inch stainless steel well screen and casing. The existing screen were removed and inspected. Details of the well replacement and inspection can be found in the MW-101S Well Replacement Memorandum (attached). Development and sampling of this well was performed during the 3<sup>rd</sup> Quarter Groundwater Monitoring Event in August 2002 (Attachment B4).

### **Geoprobe Around Barrier Wall**

Nine (9) geoprobe borings were installed approximately 100 feet outside the barrier wall (GP-01 through GP-04). Each geoprobe boring was logged to characterize the subsurface at the location of the boring and to note the presence of any readily visible contamination. Geologic logs for each borehole are attached. All borings proceeded to the siltstone. Unfiltered groundwater samples were obtained from each borehole. Three soil samples was obtained from GP-01, 02, and 08 at the 0-5-foot depth interval due to elevated PID readings. Abandoned boreholes were filled with granular bentonite, and repairs to asphalt were made with an asphaltic/concrete cold-patch. The locations were staked and labeled for subsequent survey.

### **Geoprobe from Soil Storage Cells**

Five (5) composite samples were obtained from boreholes in the stockpiled soil in the Soil Storage Cells. Each sample consisted of a composite from multiple borings in each of the three storage cells. Where possible, the soil borings were performed by a remote-controlled geoprobe unit. In some cases the boreholes were installed by hand-auger. Soil was collected from the surface to the bottom of the soil pile (approximately 6 feet). Repairs to the plastic soil cell cover were made with duct tape. Later in the fall, PWP made permanent repairs to the cover.

### **Surface Soil – West Facility**

Surface soil samples were collected from fifteen (15) locations in the Treated Pole Storage area and Treatment Plant area in the West Facility. At each location, composite samples of the 0 to 2-foot soil depth and were obtained via geoprobe. At three of these locations, an additional sample was obtained at a depth of 0 to 6-inches. After sampling, the locations were staked and labeled for subsequent survey.

### **Surface Soil – East Facility**

Twelve (12) surface soil samples were collected from the East Facility, in the area south of the railroad tracks. Samples were collected in unpaved areas or from beneath gravel, from the top 6 inches of soil.



## Residential Surface Soil

A total of thirteen (13) samples were collected from six residences. Two composite samples were collected from each residence, with the exception of RES-03 where three samples were collected due to the size of the property. Typically one sample was collected from the front yard, and one from the back yard. Each sample was a composite of five sub-samples collected from the upper 0 to 6 inches of soil. Sub-samples were obtained from gardens, bare dirt locations, and from beneath gravel, grass or other landscaping materials.

## Ditch Soil

A total of fifteen (15) soil samples were obtained from the bottom of the ditches along Rock Creek Road and Highway 18B. Samples excluded vegetation and gravel and sample depth did not exceed 6 inches. Sample locations were staked and labeled for subsequent survey (Attachment 2).

## River Sediment

Six sediment samples were obtained from the north side of the South Yamhill River, at locations of sediment deposition in the river bed, 5 to 10 feet from the shoreline. Three of the samples were located approximately 10, 50, and 100 feet downstream from the Rock Creek ditch outfall, and three were located upstream of the mouth of Rock Creek, at 10, 50, and 100-foot intervals going upstream. In addition, three sediment samples were taken from Rock Creek, one about 50 feet below the culvert under Highway 18B, one just downstream of the confluence with the North Ditch and one upstream of the railroad trestle (see Attachment B5).

## Background Arsenic

Six (6) surface soil samples were collected to evaluate background arsenic levels in the area. The samples were collected to the north and west of the site, upgradient of the predominant winds and possible surface runoff from the site. The samples were collected in unpaved areas, from the top 6 inches of soil (Attachment B6).

## Investigation Derived Waste Sampling

All cuttings and cores from the installation of monitor wells and geoprobes were drummed and stored on site. Samples were collected from each barrel to determine appropriate disposal options. The four barrels containing spoils from the treatment plant or treated pole storage areas (IDW-17S, 19S, 20S, and GEO) were sampled and analyzed for total metals and SVOCs. The remaining four barrels (IDW-18S, 21S, 22S, and 23S) were analyzed for metals and SVOCs by TCLP.

## Survey

The following parameters were determined for each new monitor well, geoprobe, surface soil (west facility), and ditch soil sample location:

- Northing
- Easting
- Ground surface elevation (feet above mean sea level [MSL]) – *wells only*

- Top of casing elevation (feet above MSL) – *wells only*

The results are attached.

## Field Documentation

Copies of the following material are attached:

- Instrument calibration logs
- PID data sheets
- Well construction and geologic logs
- Geologic logs for the geoprobe borings
- Copies of field notes

Attachment B-1  
Survey Data

**Taylor Mill Site**  
**Surveyed Points**

Field Work performed on 08-03-2002

| Point   | Northing  | Easting    | Mp Elev | Gnd Elev | Note  |
|---------|-----------|------------|---------|----------|---|
| MW-17S  | 535460.79 | 7445865.04 | 209.241 | 209.540  | MP=PVC, GND=Concrete N. side  |
| MW-18S  | 535550.16 | 7444712.92 | 211.414 | 209.120  | MP=PVC, GND=Concrete N. side  |
| MW-19S  | 534907.39 | 7445460.26 | 210.440 | 208.220  | MP=PVC, GND=Concrete N. side  |
| MW-20S  | 534793.29 | 7445739.98 | 208.870 | 206.360  | MP=PVC, GND=Concrete N. side  |
| MW-21S  | 536591.26 | 7447129.86 | 214.970 | 212.580  | MP=PVC, GND=Concrete N. side  |
| MW-22S  | 535255.62 | 7446779.92 | 205.545 | 203.015  | MP=PVC, GND=Concrete N. side  |
| MW-23S  | 535227.18 | 7447426.17 | 203.855 | 201.525  | MP=PVC, GND=Concrete N. side  |
| MW-101S | 535116.02 | 7445956.91 | 206.976 | 207.230  | MP=Top 4" Steel N. side, GND=Concrete N. side   |
| PW-1    | 534863.58 | 7445962.78 | 203.930 | 205.510  | MP=Top Cap N. side, GND = Pavement N. side  |
| PW-2    | 534933.96 | 7446113.32 | 204.960 | 206.470  | MP=Top Cap N. side, GND = Pavement N. side  |
| PW-3    | 535174.62 | 7446129.55 | 206.295 | 207.940  | MP=Top Cap N. side, GND = Pavement N. side  |
| PW-4    | 535355.83 | 7445656.48 | 206.979 | 208.540  | MP=Top Cap N. side, GND = Pavement N. side  |
| GP-01   | 535516.88 | 7446235.49 | -       | 208.22   | <p>Coordinate system is:<br/>"The Oregon Coordinate System of 1983, North Zone" (NAD83/91)<br/><b>In International Feet</b><br/>Elevations are based on GPS points that are described as<br/>being NGVD 29 per Dunkel drawing</p> |
| GP-02   | 535380.16 | 7446288.00 | -       | 207.54   |   |
| GP-04   | 534817.84 | 7446194.05 | -       | 204.89   |   |
| GP-05   | 535004.01 | 7445668.06 | -       | 208.79   |   |
| GP-06   | 535168.71 | 7445548.00 | -       | 207.43   |   |
| GP-07   | 535327.28 | 7445476.22 | -       | 208.08   |   |
| GP-08   | 535453.25 | 7445640.31 | -       | 207.55   |   |
| GP-09   | 535574.27 | 7445943.96 | -       | 209.31   |   |
| WF-01   | 535834.40 | 7446011.15 | -       | 210.08   | <p>Coordinates of these points are available in the original "Local"<br/>system and also in the incorrectly calculated State Plane coordinates<br/>(Per Dunkel drawing) on the "other coordinates" tab, this sheet.</p>           |
| WF-02   | 535830.99 | 7446135.57 | -       | 209.41   |   |
| WF-03   | 535825.14 | 7446247.79 | -       | 209.52   |   |
| WF-04   | 535711.41 | 7446129.55 | -       | 209.60   |   |
| WF-05   | 535699.50 | 7446243.04 | -       | 209.19   |   |
| WF-06   | 535636.74 | 7445896.10 | -       | 209.80   |   |
| WF-07   | 535618.14 | 7446120.40 | -       | 209.15   |   |
| WF-08   | 535596.95 | 7446230.30 | -       | 209.10   |   |
| WF-09   | 535597.42 | 7446283.74 | -       | 208.90   |   |
| WF-10   | 535515.54 | 7445863.17 | -       | 209.50   |   |
| WF-11   | 535526.37 | 7446029.67 | -       | 209.56   |   |
| WF-12   | 535476.46 | 7446279.17 | -       | 208.45   |   |
| WF-13   | 535345.44 | 7446285.73 | -       | 207.39   |   |
| WF-14   | 535204.03 | 7446291.92 | -       | 206.72   |   |

## Phase 2 Field Investigation - Conversion to local Coordinates

| point   | Correct State Plane Coordinates |                   | Local Coordinates |              |
|---------|---------------------------------|-------------------|-------------------|--------------|
|         | OR North Intl. Ft               | OR North Intl. Ft | Dunkel local      | Dunkel local |
|         | Northing                        | Easting           | Northing          | Easting      |
| GP-01   | 535516.88                       | 7446235.49        | 8682.91           | 9855.29      |
| GP-04   | 534817.84                       | 7446194.05        | 7983.26           | 9824.14      |
| GP-05   | 535004.01                       | 7445668.06        | 8161.69           | 9295.40      |
| GP-06   | 535168.71                       | 7445548.00        | 8324.63           | 9172.91      |
| GP-07   | 535327.28                       | 7445476.22        | 8482.14           | 9098.79      |
| GP-08   | 535453.25                       | 7445640.31        | 8610.53           | 9261.03      |
| GP-09   | 535574.27                       | 7445943.96        | 8736.02           | 9562.91      |
| GP-20   | 535380.16                       | 7446288.00        | 8546.97           | 9909.81      |
| MW-101S | 535116.02                       | 7445956.91        | 8277.95           | 9582.60      |
| MW-17S  | 535460.79                       | 7445865.04        | 8621.38           | 9485.66      |
| MW-18S  | 535550.16                       | 7444712.92        | 8693.78           | 8332.22      |
| MW-19S  | 534907.39                       | 7445460.26        | 8062.01           | 9089.02      |
| MW-20S  | 534793.29                       | 7445739.98        | 7952.03           | 9370.42      |
| MW-21S  | 536591.26                       | 7447129.86        | 9770.47           | 10733.85     |
| MW-22S  | 535255.62                       | 7446779.92        | 8429.67           | 10403.57     |
| MW-23S  | 535227.18                       | 7447426.17        | 8410.75           | 11050.24     |
| PW-1    | 534863.58                       | 7445962.78        | 8025.59           | 9592.19      |
| PW-2    | 534933.96                       | 7446113.32        | 8098.19           | 9741.69      |
| PW-3    | 535174.62                       | 7446129.55        | 8339.10           | 9754.38      |
| PW-4    | 535355.83                       | 7445656.48        | 8513.34           | 9278.64      |
| WF-01   | 535834.40                       | 7446011.15        | 8997.14           | 9626.27      |
| WF-02   | 535830.99                       | 7446135.57        | 8995.56           | 9750.74      |
| WF-03   | 535825.14                       | 7446247.79        | 8991.36           | 9863.05      |
| WF-04   | 535711.41                       | 7446129.55        | 8875.89           | 9746.48      |
| WF-05   | 535699.50                       | 7446243.04        | 8865.65           | 9860.15      |
| WF-06   | 535636.74                       | 7445896.10        | 8797.78           | 9514.13      |
| WF-07   | 535618.14                       | 7446120.40        | 8782.48           | 9738.70      |
| WF-08   | 535596.95                       | 7446230.30        | 8762.91           | 9848.91      |
| WF-09   | 535597.42                       | 7446283.74        | 8764.17           | 9902.35      |
| WF-10   | 535515.54                       | 7445863.17        | 8676.10           | 9482.99      |
| WF-11   | 535526.37                       | 7446029.67        | 8689.38           | 9649.32      |
| WF-12   | 535476.46                       | 7446279.17        | 8643.14           | 9899.56      |
| WF-13   | 535345.44                       | 7446285.73        | 8512.21           | 9908.04      |
| WF-14   | 535204.03                       | 7446291.92        | 8370.90           | 9916.32      |

Attachment B-2  
Soil Boring and Well  
Construction Logs



|   |                       |              |
|---|-----------------------|--------------|
| PROJECT NUMBER<br>165241.AN.01                    | WELL NUMBER<br>MW-17S | SHEET 1 OF 1 |
| MONITORING WELL RECORD DRAWING & CONSTRUCTION LOG |                       |              |

|                        |                          |              |              |                                  |         |
|------------------------|--------------------------|--------------|--------------|----------------------------------|---------|
| PROJECT NAME:          | Taylor Lumber            | LOCATION :   | Sheridan, OR | ELEV, NGVD (Top of Well Casing): | 209.241 |
| FIELD OBSERVERS:       | Michael Niemet           | START DATE:  | 07/31/2002   | SURFACE ELEV, NGVD:              | 209.540 |
| DRIILLING METHOD:      | 6 5/8" Hollow Stem Auger | FINISH DATE: | 07/31/2002   | NORTHING:                        | 8621.38 |
| DRIILLING CONTRACTOR : | GeoTech Explorations     | EASTING:     | 9485.66      |                                  |         |

#### WELL CONSTRUCTION MATERIALS

|                 |    |            |    |        |
|-----------------|----|------------|----|--------|
| BOREHOLE DIA(S) | 10 | INCHES TO: | 16 | FT BGS |
|                 |    | INCHES TO: |    | FT BGS |
|                 |    | INCHES TO: |    | FT BGS |

|                            |                      |               |     |
|----------------------------|----------------------|---------------|-----|
| PROTECTIVE CASING TYPE     | Flush Mount Vault    |               |     |
| PROTECTIVE CASING DIAMETER |                      |               |     |
| WELL CASING TYPE           | Sched 40 PVC         | DIAMETER      | 2"  |
| COUPLING TYPE              | Threaded             |               |     |
| SCREEN TYPE                | Sched 40 PVC         | DIAMETER      | 2"  |
| SLOT SIZE                  | 0.010"               | SCREEN LENGTH | 10' |
| TOP CAP TYPE               | J-Plug               |               |     |
| END CAP/PLUG TYPE          | Threaded Cone (6")   |               |     |
| CENTRALIZER TYPE           |                      |               |     |
| CENTRALIZER LOCATION(S)    |                      |               |     |
| FILTER PACK TYPE           | Colorado Silica Sand |               |     |
| GRADUATION                 | 10 X 20              |               |     |

#### SEALS (S)

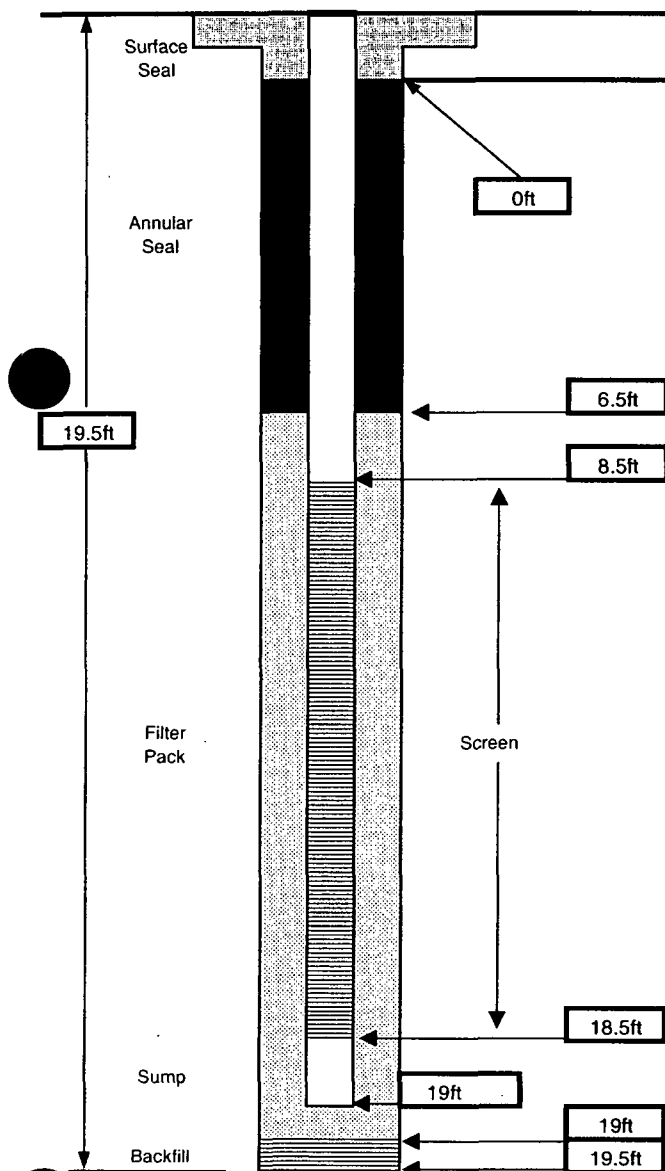
|          |                           |
|----------|---------------------------|
| SURFACE  | Concrete                  |
| ANNULAR  | Bentonite                 |
| BACKFILL | Bentonite Chips-hole plug |

#### MATERIAL TYPE

|           |               |
|-----------|---------------|
| Concrete  | 60 lb bags    |
| Bentonite | 3 50 lb bags  |
| Sand      | 16 50 lb bags |

#### NOTES

|                |        |
|----------------|--------|
| Start Card # : | 150072 |
| Well Tag #:    | L58168 |
| Drums:         | 3      |





PROJECT NUMBER

165241.RR.01

BORING NUMBER

MW-17S

SHEET 1 OF 1

# SOIL BORING LOG

PROJECT NAME : Taylor Lumber -Phase 2 Field Investigation

LOCATION : Sheridan, OR

LOGGER: Mike Niemet

START DATE: 7/31/02 12:30

DRILLING METHOD: 6 5/8" Hollow Stem Auger

FINISH DATE: 7/31/02 14:00

DRILLING CONTRACTOR : GeoTech Explorations

WATER LEVELS:

| DEPTH BELOW SURFACE (FT) | SAMPLE   |                 |               | STANDARD PENETRATION TEST RESULTS<br>6"-6"-6" (N) | SOIL DESCRIPTION<br>SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY. | COMMENTS<br>DEPTH OF CASING, DRILLING RATE<br>DRILLING FLUID LOSS<br>TESTS AND INSTRUMENTATION |
|--------------------------|----------|-----------------|---------------|---|--|--|
|                          | INTERVAL | NUMBER AND TYPE | RECOVERY (FT) |   |  |  |
|                          |          |                 |               |   |  |  |
| 5                        | 1.5      |                 | 1.2           | 14-50-32  | Fill brown silt w/fill, dry.   | PID=10   |
|                          | 1.5      |                 | 0.2           | 17-17-19  | Brown silt, stiff, dry, dark grey when broken (ML) silt.   |  |
|                          | 1.5      | MW-17S          | 1.3           | 12-14-7   | Dark grey silt, moist, plastic w/some fill in upper 4" (ML).   | PID=30<br>Driller noted slight odor, but we were next to wood pile.                            |
|                          | 1.5      |                 | 0             | 2-5-8   | No recovery.   |  |
|                          | 1.5      |                 | 1.5           | 4-4-3   | 1.0 lt brn sandy silt (ML), moist, sl plas<br>0.5 gravely silt, dark grey moist.   | PID=0  |
| 10                       | 1.5      |                 | 1.5           | 3-3-4   | 0.3" sandy silt, dk grey to lt brn, moist<br>1.0 light brown silt, moist.  | PID=0  |
|                          | 1.5      |                 | 1.4           | 10-22-22  | 0.5" lt brn sandy silt, moist (ML).<br>1.0 lt brn/grey silty sandy grav wet(GM).   |  |
|                          | 1.5      |                 | 0.8           | 10-22-22  | same as above(GM).   | PID=0  |
| 15                       | 1.5      |                 | 1.4           | 11-16-40  | 0.5" same as above.<br>1.0 sandy silt, lt brn, wet, very soft w/ some gravel (SM).   | PID=0  |
|                          | 1.0      |                 | 0.5           | 20-50(5")   | same as above  | PID=0  |
|                          |          |                 |               |   | same as above  |  |
|                          | 1.5      |                 | 0.5           | 22-50(5")   | sandy gravel, wet 6"   | PID=0  |
| 20                       |          |                 |               | 15-50(6")<br>12-50(4")                            | siltstone @ 18.0   | PID=0<br>Driller notes siltstone @ 18ft.   |
|                          |          |                 |               |   | End of Boring at 19.5ft  |  |
|                          |          |                 |               |   |  |  |
| 25                       |          |                 |               |   |  |  |





PROJECT NUMBER  
165241.AN.01

WELL NUMBER  
MW-18S

SHEET 1 OF 1

MONITORING WELL RECORD DRAWING & CONSTRUCTION LOG

|                       |                          |              |              |                                  |         |
|-----------------------|--------------------------|--------------|--------------|----------------------------------|---------|
| PROJECT NAME:         | Taylor Lumber            | LOCATION :   | Sheridan, OR | ELEV, NGVD (Top of Well Casing): | 211.414 |
| FIELD OBSERVERS:      | Michael Niemet/Rob Healy | START DATE:  | 07/30/2002   | SURFACE ELEV, NGVD:              | 209.120 |
| DRILLING METHOD:      | 6 5/8" Hollow Stem Auger | FINISH DATE: | 07/30/2002   | NORTHING:                        | 8693.78 |
| DRILLING CONTRACTOR : | GeoTech Explorations     | EASTING:     | 8332.22      |                                  |         |

WELL CONSTRUCTION MATERIALS

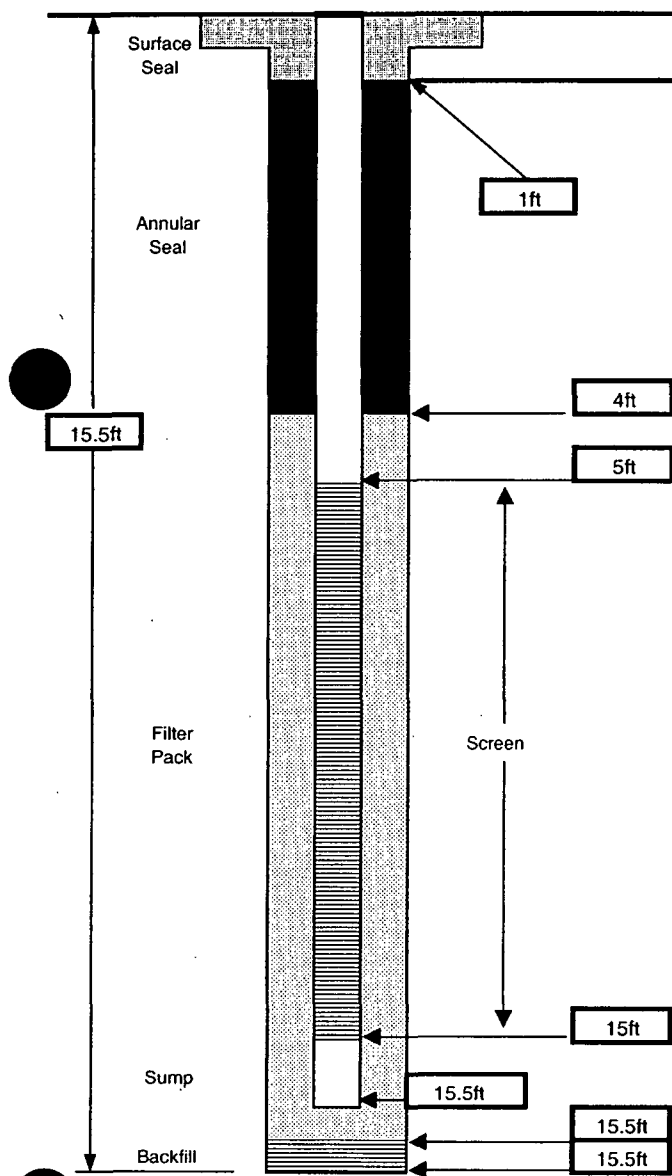
|                 |    |            |      |        |
|-----------------|----|------------|------|--------|
| BOREHOLE DIA(S) | 10 | INCHES TO: | 15.5 | FT BGS |
|                 |    | INCHES TO: |      | FT BGS |
|                 |    | INCHES TO: |      | FT BGS |

|                            |                             |
|----------------------------|-----------------------------|
| PROTECTIVE CASING TYPE     | Above ground Steel Monument |
| PROTECTIVE CASING DIAMETER | 6"                          |
| WELL CASING TYPE           | Sched 40 PVC                |
| COUPLING TYPE              | Threaded                    |
| SCREEN TYPE                | Sched 40 PVC                |
| SLOT SIZE                  | 0.010"                      |
| TOP CAP TYPE               | J-Plug                      |
| END CAP/PLUG TYPE          | Threaded Cone (6")          |
| CENTRALIZER TYPE           |                             |
| CENTRALIZER LOCATION(S)    |                             |
| FILTER PACK TYPE           | Colorado Silica Sand        |
| GRADUATION                 | 10 X 20                     |

|           |                           |
|-----------|---------------------------|
| SEALS (S) |                           |
| SURFACE   | Concrete                  |
| ANNULAR   | Bentonite                 |
| BACKFILL  | Bentonite Chips-hole plug |

|               |               |
|---------------|---------------|
| MATERIAL TYPE |               |
| Concrete      | 60 lb bags    |
| Bentonite     | 4 50 lb bags  |
| Sand          | 14 50 lb bags |

|                |        |
|----------------|--------|
| NOTES          |        |
| Start Card # : | 150069 |
| Well Tag #:    | L58165 |
| Drums:         | 2      |





PROJECT NUMBER  
165241.RR.01

BORING NUMBER  
MW-18S

SHEET 1 OF 1

## SOIL BORING LOG

PROJECT NAME : Taylor Lumber -Phase 2 Field Investigation

LOCATION : Sheridan, OR

LOGGER: Mike Nieme/Rob Healy

START DATE: 7/30/02 13:30

DRILLING METHOD: 6 5/8" Hollow Stem Auger

FINISH DATE: 7/30/02 16:30

DRILLING CONTRACTOR : GeoTech Explorations

WATER LEVELS:

| DEPTH BELOW SURFACE (FT) | SAMPLE   |                 |               | STANDARD PENETRATION TEST RESULTS<br>6"-6"-6" (N) | SOIL DESCRIPTION<br>SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY. | COMMENTS<br>DEPTH OF CASING, DRILLING RATE<br>DRILLING FLUID LOSS<br>TESTS AND INSTRUMENTATION |
|--------------------------|----------|-----------------|---------------|---|--|--|
|                          | INTERVAL | NUMBER AND TYPE | RECOVERY (FT) |   |  |  |
| 5                        | 1.5      |                 | 1             | 18-17-18  | Silt(ML), light brown, dry, very stiff.  | PID=0  |
|                          |          |                 |               |   | 6"-Silt, light brown, moist, soft, coarser than above(ML).   | PID=0  |
|                          | 1.5      |                 | 1.5           | 8-7-4   | 6"-Silty gravel, light brown, wet, 1/4" minus, sub angular gravel(GM).   |  |
|                          | 1.5      |                 | 0.25          | 6-6-12  | 6"-Silt w/trace gravel, dark brown, soft, moist, plastic(ML).  |  |
| 10                       |          |                 |               |   | Silty sand(medium to coarse), moist, soft, light brown, trace gravels(SM).   |  |
|                          | 1.5      |                 |               | 14-24-34  | Gravel w/silt, moist, and some sand, basalt gravel w/light brown silt(GM). 1.5" minus.   | Sub-angular to sub-rounded gravel.<br>PID=0  |
|                          |          |                 |               |   |  | Driller noted gravel @ 12-14 1/2 feet.   |
| 15                       | 1.5      |                 |               | 28-50(2)  | Silty sandy gravel(GM) 1/2" minus rounded, fine to coarse sand, wet, much finer than @ 10ft.   | PID=0  |
|                          | 1        |                 |               |   | Siltstone.   | Siltstone @ 15 1/2.  |
| 20                       |          |                 |               | 50(6)-50(6)                                       |  |  |
|                          |          |                 |               |   |  |  |
| 25                       |          |                 |               |   |  |  |
|                          |          |                 |               |   |  |  |



PROJECT NUMBER  
165241.AN.01

WELL NUMBER  
MW-19S

SHEET 1 OF 1

MONITORING WELL RECORD DRAWING & CONSTRUCTION LOG

|                       |                          |              |              |                                  |         |
|-----------------------|--------------------------|--------------|--------------|----------------------------------|---------|
| PROJECT NAME:         | Taylor Lumber            | LOCATION :   | Sheridan, OR | ELEV, NGVD (Top of Well Casing): | 210.440 |
| FIELD OBSERVERS:      | Michael Niemet           | START DATE:  | 07/31/2002   | SURFACE ELEV, NGVD:              | 208.220 |
| DRILLING METHOD:      | 6 5/8" Hollow Stem Auger | FINISH DATE: | 07/31/2002   | NORTHING:                        | 8062.01 |
| DRILLING CONTRACTOR : | GeoTech Explorations     | EASTING:     |              |                                  | 9089.02 |

WELL CONSTRUCTION MATERIALS

|                 |    |            |    |        |
|-----------------|----|------------|----|--------|
| BOREHOLE DIA(S) | 10 | INCHES TO: | 16 | FT BGS |
|                 |    | INCHES TO: |    | FT BGS |
|                 |    | INCHES TO: |    | FT BGS |

|                            |                             |                   |
|----------------------------|-----------------------------|-------------------|
| PROTECTIVE CASING TYPE     | Above ground Steel Monument |                   |
| PROTECTIVE CASING DIAMETER | 6"                          |                   |
| WELL CASING TYPE           | Sched 40 PVC                | DIAMETER 2"       |
| COUPLING TYPE              | Threaded                    |                   |
| SCREEN TYPE                | Sched 40 PVC                | DIAMETER 2"       |
| SLOT SIZE                  | 0.010"                      | SCREEN LENGTH 10' |
| TOP CAP TYPE               | J-Plug                      |                   |
| END CAP/PLUG TYPE          | Threaded Cone (6")          |                   |
| CENTRALIZER TYPE           |                             |                   |
| CENTRALIZER LOCATION(S)    |                             |                   |
| FILTER PACK TYPE           | Colorado Silica Sand        |                   |
| GRADUATION                 | 10 X 20                     |                   |

SEALS (S)

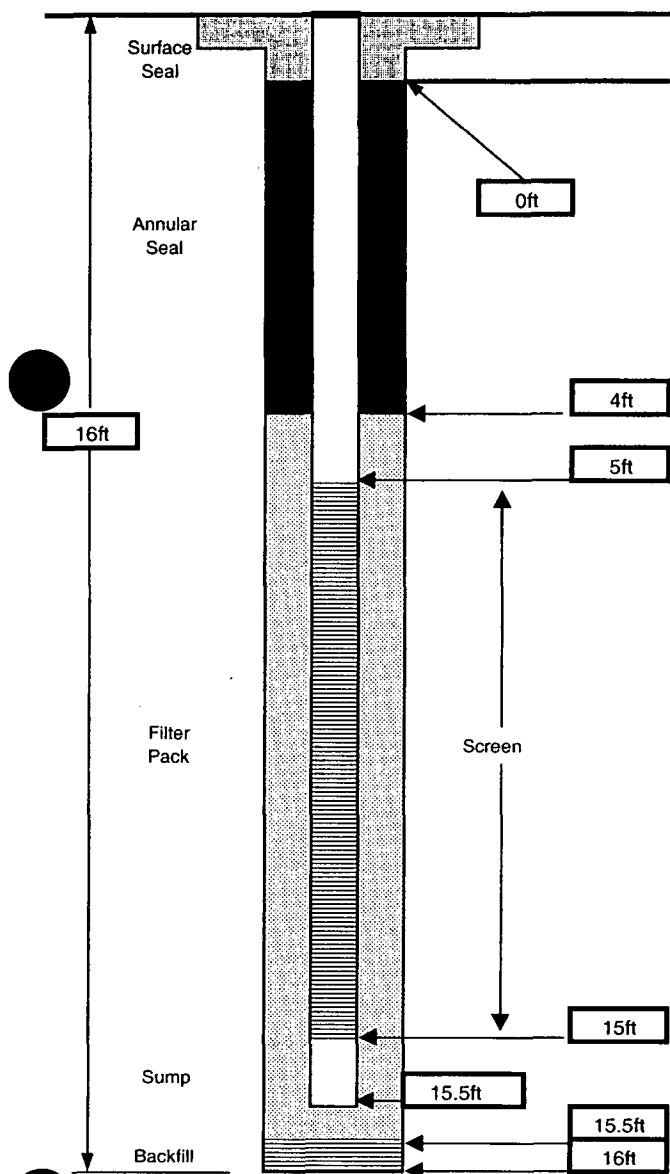
|          |                           |
|----------|---------------------------|
| SURFACE  | Concrete                  |
| ANNULAR  | Bentonite                 |
| BACKFILL | Bentonite Chips-hole plug |

MATERIAL TYPE

|           |    |            |
|-----------|----|------------|
| Concrete  | 6  | 60 lb bags |
| Bentonite | 3  | 50 lb bags |
| Sand      | 14 | 50 lb bags |

NOTES

|                |        |
|----------------|--------|
| Start Card # : | 150071 |
| Well Tag #:    | L58167 |
| Drums:         | 2      |





PROJECT NUMBER

165241.RR.01

BORING NUMBER

MW-19S

SHEET 1 OF 1

## SOIL BORING LOG

PROJECT NAME : Taylor Lumber -Phase 2 Field Investigation

LOCATION : Sheridan, OR

LOGGER: Mike Niemet

START DATE: 7/31/02 8:45

DRILLING METHOD: 6 5/8" Hollow Stem Auger

FINISH DATE: 7/31/02 9:45

DRILLING CONTRACTOR : GeoTech Explorations

WATER LEVELS:

| DEPTH BELOW<br>SURFACE (FT)   | SAMPLE   |                    |                  | STANDARD<br>PENETRATION<br>TEST<br>RESULTS<br><br>6"-6"-6"<br>(N) | SOIL DESCRIPTION<br><br>SOIL NAME, USCS GROUP SYMBOL, COLOR,<br>MOISTURE CONTENT, RELATIVE DENSITY,<br>OR CONSISTENCY, SOIL STRUCTURE,<br>MINERALOGY. | COMMENTS<br><br>DEPTH OF CASING, DRILLING RATE<br>DRILLING FLUID LOSS<br>TESTS AND INSTRUMENTATION |
|---|----------|--------------------|------------------|---|---|--|
|   | INTERVAL | NUMBER<br>AND TYPE | RECOVERY<br>(FT) |   |   |  |
|   |          |                    |                  |   |   |  |
| 5<br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br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|          |                    |                  |   |   |  |



|   |                       |              |
|---|-----------------------|--------------|
| PROJECT NUMBER<br>165241.AN.01                    | WELL NUMBER<br>MW-20S | SHEET 1 OF 1 |
| MONITORING WELL RECORD DRAWING & CONSTRUCTION LOG |                       |              |

|                       |                          |              |              |                                  |         |
|-----------------------|--------------------------|--------------|--------------|----------------------------------|---------|
| PROJECT NAME:         | Taylor Lumber            | LOCATION :   | Sheridan, OR | ELEV, NGVD (Top of Well Casing): | 208.870 |
| FIELD OBSERVERS:      | Michael Niemet/Rob Healy | START DATE:  | 07/30/2002   | SURFACE ELEV, NGVD:              | 206.360 |
| DRILLING METHOD:      | 6 5/8" Hollow Stem Auger | FINISH DATE: | 07/30/2002   | NORTHING:                        | 7952.03 |
| DRILLING CONTRACTOR : | GeoTech Explorations     | EASTING:     | 9370.42      |                                  |         |

#### WELL CONSTRUCTION MATERIALS

|                 |    |            |      |        |
|-----------------|----|------------|------|--------|
| BOREHOLE DIA(S) | 10 | INCHES TO: | 14.5 | FT BGS |
|                 |    | INCHES TO: |      | FT BGS |
|                 |    | INCHES TO: |      | FT BGS |

|                            |                             |                   |
|----------------------------|-----------------------------|-------------------|
| PROTECTIVE CASING TYPE     | Above ground Steel Monument |                   |
| PROTECTIVE CASING DIAMETER | 6"                          |                   |
| WELL CASING TYPE           | Sched 40 PVC                | DIAMETER 2"       |
| COUPLING TYPE              | Threaded                    |                   |
| SCREEN TYPE                | Sched 40 PVC                | DIAMETER 2"       |
| SLOT SIZE                  | 0.010"                      | SCREEN LENGTH 10' |
| TOP CAP TYPE               | J-Plug                      |                   |
| END CAP/PLUG TYPE          | Threaded Cone (6")          |                   |
| CENTRALIZER TYPE           |                             |                   |
| CENTRALIZER LOCATION(S)    |                             |                   |
| FILTER PACK TYPE           | Colorado Silica Sand        |                   |
| GRADUATION                 | 10 X 20                     |                   |

#### SEALS (S)

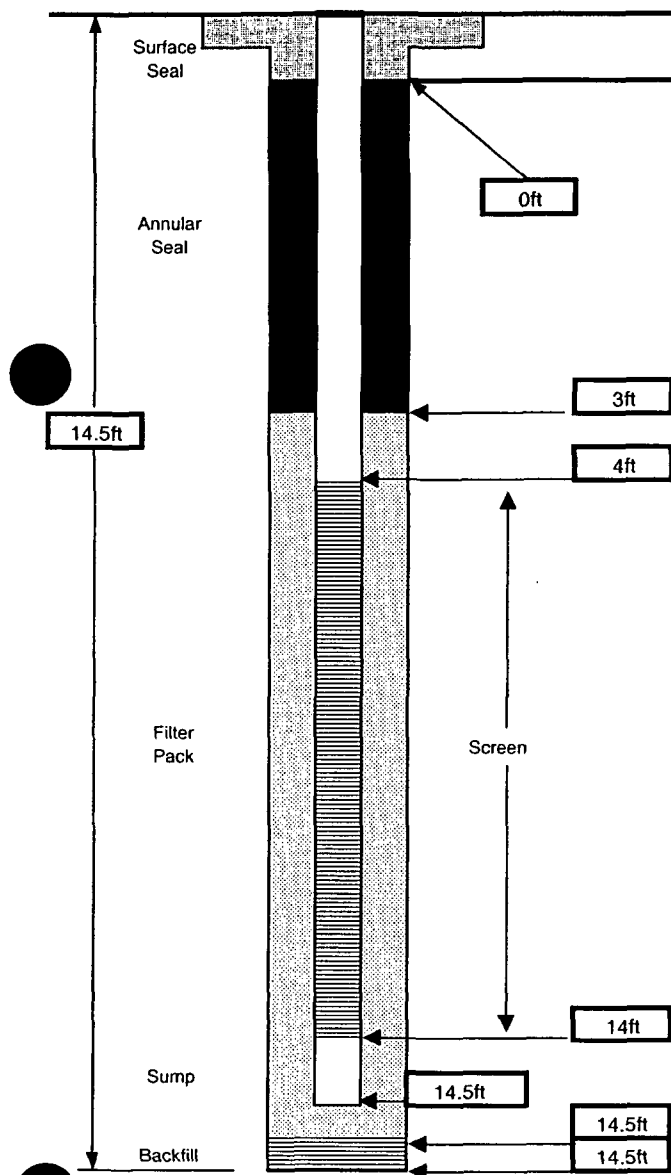
|          |                           |
|----------|---------------------------|
| SURFACE  | Concrete                  |
| ANNULAR  | Bentonite                 |
| BACKFILL | Bentonite Chips-hole plug |

#### MATERIAL TYPE

|           |    |            |
|-----------|----|------------|
| Concrete  | 6  | 60 lb bags |
| Bentonite | 3  | 50 lb bags |
| Sand      | 12 | 50 lb bags |

#### NOTES

|                |        |
|----------------|--------|
| Start Card # : | 150070 |
| Well Tag #:    | L58166 |
| Drums:         | 2      |





PROJECT NUMBER  
165241.RR.01

BORING NUMBER  
MW-20S

SHEET 1 OF 1

## SOIL BORING LOG

PROJECT NAME : Taylor Lumber -Phase 2 Field Investigation

LOCATION : Sheridan, OR

LOGGER: Mike Niemet/Rob Healy

START DATE: 7/30/02 15:45

DRILLING METHOD: 6 5/8" Hollow Stem Auger

FINISH DATE: 7/30/02 16:40

DRILLING CONTRACTOR : GeoTech Explorations

WATER LEVELS:

| DEPTH BELOW SURFACE (FT)   | SAMPLE   |                 |               | STANDARD PENETRATION TEST RESULTS<br>6"-6"-6" (N) | SOIL DESCRIPTION<br>SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY. | COMMENTS<br>DEPTH OF CASING, DRILLING RATE<br>DRILLING FLUID LOSS<br>TESTS AND INSTRUMENTATION |
|--|----------|-----------------|---------------|---|--|--|
|  | INTERVAL | NUMBER AND TYPE | RECOVERY (FT) |   |  |  |
|  |          |                 |               |   |  |  |
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PROJECT NUMBER  
165241.AN.01

WELL NUMBER  
MW-21S

SHEET 1 OF 1

MONITORING WELL RECORD DRAWING & CONSTRUCTION LOG

PROJECT NAME: Taylor Lumber-Phase 2 Field Investigation LOCATION: Sheridan, OR ELEV, NGVD (Top of Well Casing): 214.970  
FIELD OBSERVERS: Rob Healy START DATE: 07/29/2002 SURFACE ELEV, NGVD: 212.580  
DRILLING METHOD: 6 5/8" Hollow Stem Auger FINISH DATE: 07/29/2002 NORTHING: 9770.47  
DRILLING CONTRACTOR: GeoTech Explorations EASTING: 10733.85

WELL CONSTRUCTION MATERIALS

|                 |    |                 |        |
|-----------------|----|-----------------|--------|
| BOREHOLE DIA(S) | 10 | INCHES TO: 25.5 | FT BGS |
|                 |    | INCHES TO:      | FT BGS |
|                 |    | INCHES TO:      | FT BGS |

|                            |                                     |
|----------------------------|-------------------------------------|
| PROTECTIVE CASING TYPE     | Above ground Steel with 7' ballards |
| PROTECTIVE CASING DIAMETER | 6"                                  |
| WELL CASING TYPE           | Sched 40 PVC                        |
| COUPLING TYPE              | Threaded                            |
| SCREEN TYPE                | Sched 40 PVC                        |
| SLOT SIZE                  | 0.010"                              |
| TOP CAP TYPE               | J-Plug                              |
| END CAP/PLUG TYPE          | Threaded Cone (6")                  |
| CENTRALIZER TYPE           |                                     |
| CENTRALIZER LOCATION(S)    |                                     |
| FILTER PACK TYPE           | Colorado Silica Sand                |
| GRADUATION                 | 10 X 20                             |

SEALS (S)

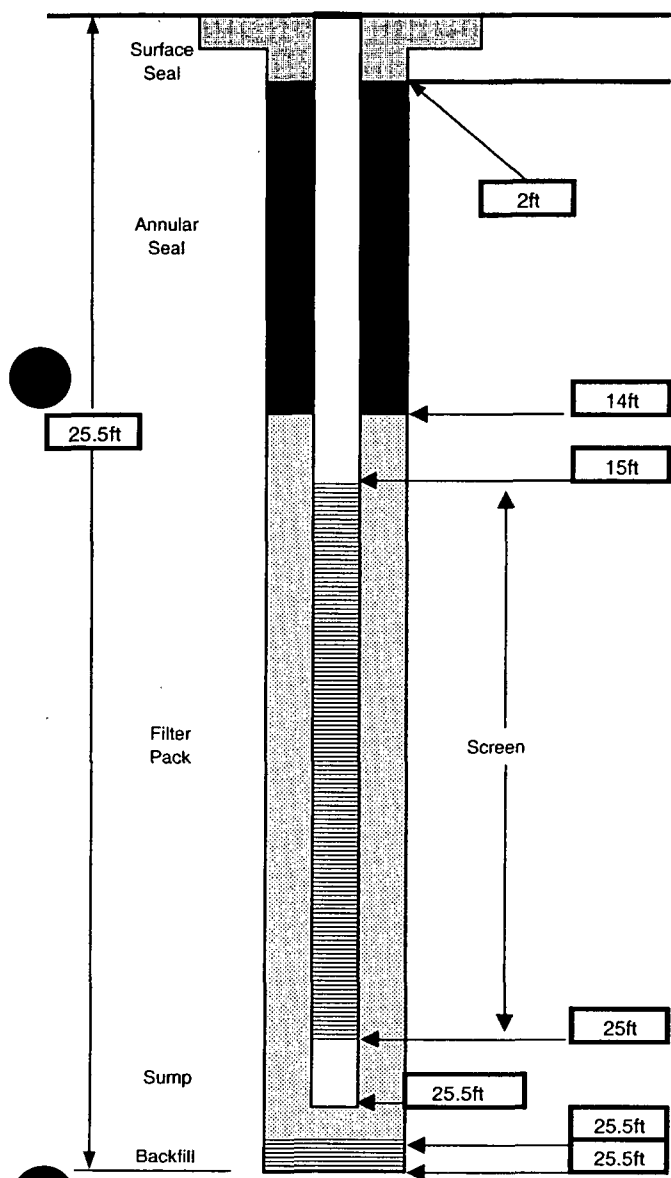
|          |                           |
|----------|---------------------------|
| SURFACE  | Concrete                  |
| ANNULAR  | Bentonite                 |
| BACKFILL | Bentonite Chips-hole plug |

MATERIAL TYPE

|           |               |
|-----------|---------------|
| Concrete  | 5 60 lb bags  |
| Bentonite | 7 50 lb bags  |
| Sand      | 14 50 lb bags |

NOTES

|               |        |
|---------------|--------|
| Start Card #: | 150067 |
| Well Tag #:   | L58163 |
| Drums:        | 3      |





PROJECT NUMBER

165241.RR.01

BORING NUMBER

MW-21S

SHEET 1 OF 1

# SOIL BORING LOG

PROJECT NAME : Taylor Lumber -Phase 2 Field Investigation

LOCATION : Sheridan, OR

LOGGER: Rob Healy

START DATE: 7/29/02 14:45

DRILLING METHOD: 6 5/8" Hollow Stem Auger

FINISH DATE: 7/29/02 15:15

DRILLING CONTRACTOR : GeoTech Explorations

WATER LEVELS:

| DEPTH BELOW<br>SURFACE (FT) | SAMPLE   |                    |                  | STANDARD<br>PENETRATION<br>TEST<br>RESULTS<br>6"-6"-6"<br>(N) | SOIL DESCRIPTION<br><br>SOIL NAME, USCS GROUP SYMBOL, COLOR,<br>MOISTURE CONTENT, RELATIVE DENSITY,<br>OR CONSISTENCY, SOIL STRUCTURE,<br>MINERALOGY. | COMMENTS<br><br>DEPTH OF CASING, DRILLING RATE<br>DRILLING FLUID LOSS<br>TESTS AND INSTRUMENTATION |
|-----------------------------|----------|--------------------|------------------|---|---|--|
|                             | INTERVAL | NUMBER<br>AND TYPE | RECOVERY<br>(FT) |   |   |  |
|                             |          |                    |                  |   |   |  |
| 5                           | 1.5      |                    | 1                | 4-4-5   | Dark gray silt(ML). Moist, some mottling,<br>wood debris. Plastic.  | 1ppm-PID   |
| 10                          | 1.5      |                    | 1                | 6-7-8   | Light brown silt(ML). Moist. Iron-staining.<br>Moderately plastic. Stiff.   | 3ppm-PID   |
| 15                          | 1.5      |                    | 1.5              | 3-5-5   | Olive gray clay(CL). Some silt. Moist,<br>plastic, medium stiff.  | 1ppm-PID   |
| 20                          | 1.5      |                    | 1.5              | 2-2-2   | Olive gray clay(CL) moist. Plastic. Soft.   | 2ppm-PID   |
| 25                          | 1.5      |                    | 1                | 3-15-22   | Olive gray silty sandy gravel(GM) wet.<br>Medium to fine sands. 1" minus sub-<br>rounded gravel.  | Internal from 23-24.5<br>5ppm-PID<br><1ppm-PID   |
|                             | 1.5      |                    | 1                | 16-17-32  | Same as above.<br>Silt stone in shoe.   | Over-drilling to 25.5 to set well.   |





|  |                                     |
|--|-------------------------------------|
| <b>PROJECT NUMBER</b><br>165241.AN.01                        | <b>WELL NUMBER</b><br><b>MW-22S</b> |
| SHEET 1 OF 1   |                                     |
| <b>MONITORING WELL RECORD DRAWING &amp; CONSTRUCTION LOG</b> |                                     |

|                              |                                      |                     |              |   |          |
|------------------------------|--------------------------------------|---------------------|--------------|---|----------|
| <b>PROJECT NAME:</b>         | Taylor Lumber-Phase 2 Field Investig | <b>LOCATION :</b>   | Sheridan, OR | <b>ELEV, NGVD (Top of Well Casing):</b> | 205.545  |
| <b>FIELD OBSERVERS:</b>      | Rob Healy                            | <b>START DATE:</b>  | 07/30/2002   | <b>SURFACE ELEV, NGVD:</b>              | 203.015  |
| <b>DRILLING METHOD:</b>      | 6 5/8" Hollow Stem Auger             | <b>FINISH DATE:</b> | 07/30/2002   | <b>NORTHING:</b>                        | 8429.67  |
| <b>DRILLING CONTRACTOR :</b> | GeoTech Explorations                 | <b>EASTING:</b>     |              |   | 10403.57 |

#### WELL CONSTRUCTION MATERIALS

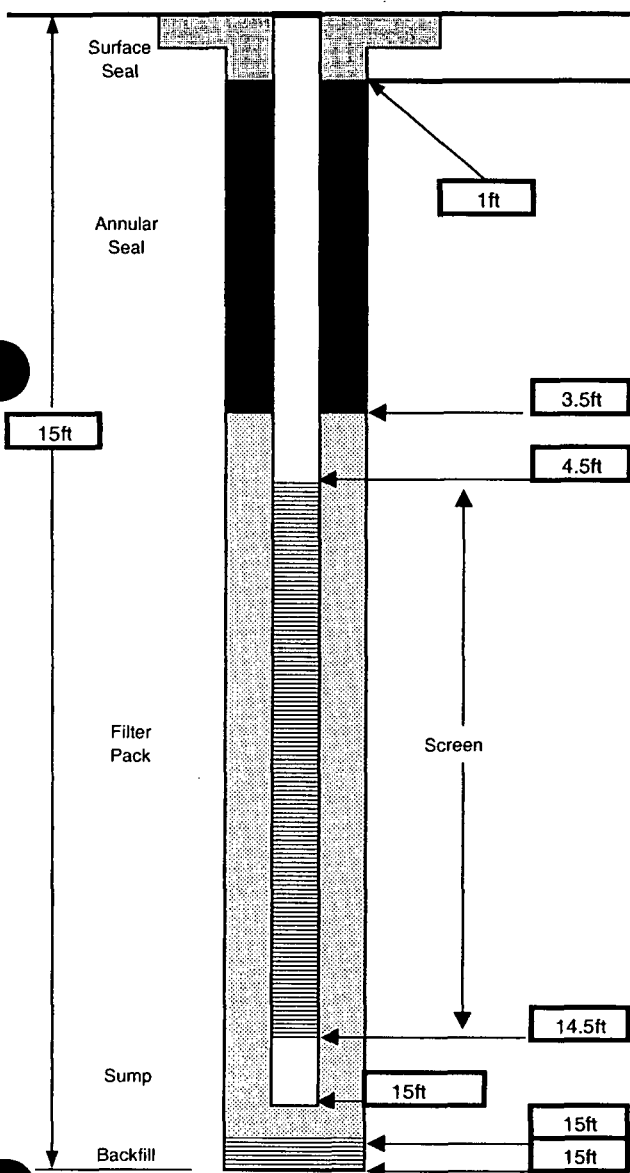
|                        |    |                   |    |               |
|------------------------|----|-------------------|----|---------------|
| <b>BOREHOLE DIA(S)</b> | 10 | <b>INCHES TO:</b> | 15 | <b>FT BGS</b> |
|                        |    | <b>INCHES TO:</b> |    | <b>FT BGS</b> |
|                        |    | <b>INCHES TO:</b> |    | <b>FT BGS</b> |

|                                   |                                  |
|-----------------------------------|----------------------------------|
| <b>PROTECTIVE CASING TYPE</b>     | Above ground Steel with ballards |
| <b>PROTECTIVE CASING DIAMETER</b> | 6"                               |
| <b>WELL CASING TYPE</b>           | Sched 40 PVC                     |
| <b>COUPLING TYPE</b>              | Threaded                         |
| <b>SCREEN TYPE</b>                | Sched 40 PVC                     |
| <b>SLOT SIZE</b>                  | 0.010"                           |
| <b>TOP CAP TYPE</b>               | J-Plug                           |
| <b>END CAP/PLUG TYPE</b>          | Threaded Cone (6")               |
| <b>CENTRALIZER TYPE</b>           |                                  |
| <b>CENTRALIZER LOCATION(S)</b>    |                                  |
| <b>FILTER PACK TYPE</b>           | Colorado Silica Sand             |
| <b>GRADUATION</b>                 | 10 X 20                          |

|                  |                           |
|------------------|---------------------------|
| <b>SEALS (S)</b> |                           |
| <b>SURFACE</b>   | Concrete                  |
| <b>ANNULAR</b>   | Bentonite                 |
| <b>BACKFILL</b>  | Bentonite Chips-hole plug |

|                      |               |
|----------------------|---------------|
| <b>MATERIAL TYPE</b> |               |
| Concrete             | 5 60 lb bags  |
| Bentonite            | 3 50 lb bags  |
| Sand                 | 14 50 lb bags |

|              |                       |
|--------------|-----------------------|
| <b>NOTES</b> |                       |
|              | Start Card # : 150068 |
|              | Well Tag #: L58164    |
|              | Drums: 1              |





PROJECT NUMBER

165241.RR.01

BORING NUMBER

MW-22S

SHEET 1 OF 1

# SOIL BORING LOG

PROJECT NAME : Taylor Lumber -Phase 2 Field Investigation

LOCATION : Sheridan, OR

LOGGER: Rob Healy/Michael Niemet

START DATE: 7/30/02 9:00

DRILLING METHOD: 6 5/8" Hollow Stem Auger

FINISH DATE: 7/30/02 11:30

DRILLING CONTRACTOR : GeoTech Explorations

WATER LEVELS:

| DEPTH BELOW SURFACE (FT) | SAMPLE   |                 |               | STANDARD     | SOIL DESCRIPTION   | COMMENTS   |
|--------------------------|----------|-----------------|---------------|--------------|--|--|
|                          | INTERVAL | NUMBER AND TYPE | RECOVERY (FT) | PENETRATION  | SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY. | DEPTH OF CASING, DRILLING RATE<br>DRILLING FLUID LOSS<br>TESTS AND INSTRUMENTATION |
|                          |          |                 |               | TEST RESULTS |  |  |
|                          |          |                 |               | 6"-6'-6" (N) |  |  |
| 5                        |          |                 |               |              | Silt, ML, Brown, dry. Very stiff roots.  | PID=n/a  |
|                          | 1.5      |                 | 0.5           | 21-20-21     |  |  |
|                          |          |                 |               |              |  |  |
|                          | 1.5      |                 | 1.0           | 5-9-8        | Silt w/some clay(ML). Brown w/iron, staining, stiff, moist, plastic.   |  |
|                          |          |                 |               |              |  |  |
|                          | 1.5      |                 | 0             |              |  |  |
| 10                       |          |                 |               |              | Medium sand w/silt(SM). Olive to dark gray, loose, wet.  | Driller noted gravel @ 11.5  |
|                          | 1.5      |                 | 0.5           | 1-1-1        |  |  |
|                          |          |                 |               |              |  |  |
|                          |          |                 |               |              | Silty sandy gravel, olive to dark grey. Medium dense, medium coarse sand, 1/2 " minus gravel(angular)-GM.            | Driller noted siltstone @ 14ft.  |
|                          | 1.5      |                 | 1.5           | 6-17-30      |  |  |
|                          |          |                 |               |              |  |  |
| 15                       |          |                 |               |              | Siltstone.   | Plug of siltstone wedged in Auger, had to pull Auger out of hole to remove plug.   |
| 20                       |          |                 |               |              |  |  |
| 25                       |          |                 |               |              |  |  |



PROJECT NUMBER  
165241.AN.01

WELL NUMBER  
MW-23S

SHEET 1 OF 1

MONITORING WELL RECORD DRAWING & CONSTRUCTION LOG

PROJECT NAME: Taylor Lumber-Phase 2 Field Investig LOCATION : Sheridan, OR ELEV, NGVD (Top of Well Casing): 203.855  
FIELD OBSERVERS: Rob Healy START DATE: 07/29/2002 SURFACE ELEV, NGVD: 201.525  
DRILLING METHOD: 6 5/8" Hollow Stem Auger FINISH DATE: 07/29/2002 NORTHING: 8410.75  
DRILLING CONTRACTOR : GeoTech Explorations EASTING: 11050.24

WELL CONSTRUCTION MATERIALS

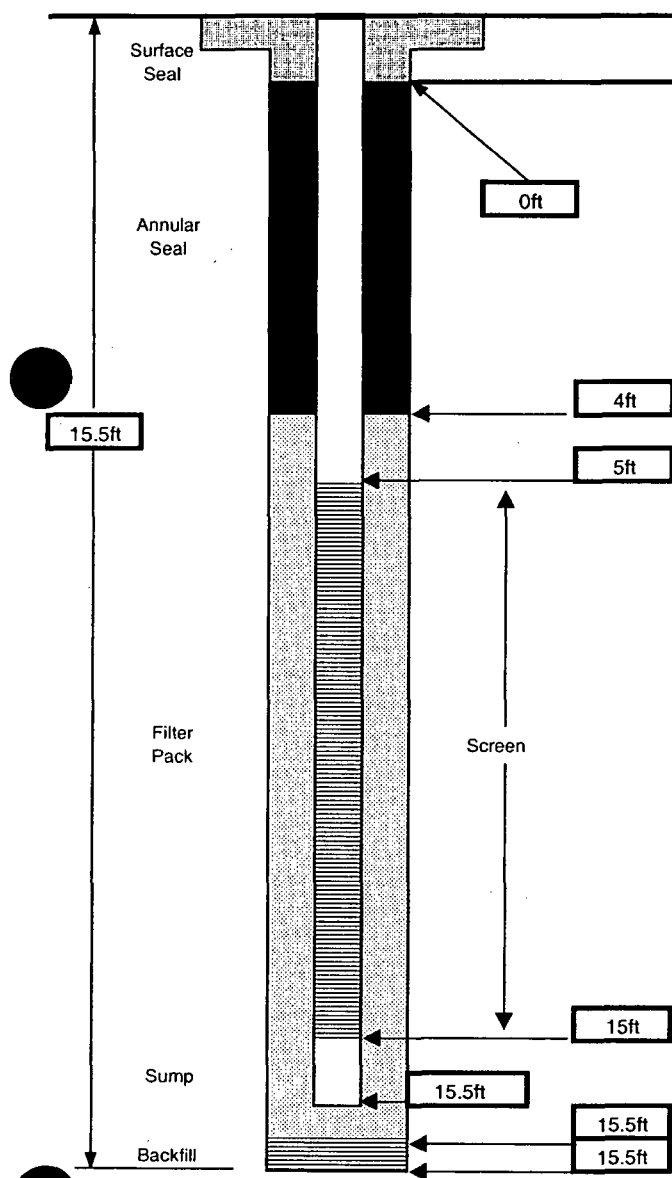
|                 |    |                 |        |
|-----------------|----|-----------------|--------|
| BOREHOLE DIA(S) | 10 | INCHES TO: 15.5 | FT BGS |
|                 |    | INCHES TO:      | FT BGS |
|                 |    | INCHES TO:      | FT BGS |

|                            |                                     |               |     |
|----------------------------|-------------------------------------|---------------|-----|
| PROTECTIVE CASING TYPE     | Above ground Steel with 7' ballards |               |     |
| PROTECTIVE CASING DIAMETER | 6"                                  |               |     |
| WELL CASING TYPE           | Sched 40 PVC                        | DIAMETER      | 2"  |
| COUPLING TYPE              | Threaded                            |               |     |
| SCREEN TYPE                | Sched 40 PVC                        | DIAMETER      | 2"  |
| SLOT SIZE                  | 0.010"                              | SCREEN LENGTH | 10' |
| TOP CAP TYPE               | J-Plug                              |               |     |
| END CAP/PLUG TYPE          | Threaded Cone                       |               |     |
| CENTRALIZER TYPE           |                                     |               |     |
| CENTRALIZER LOCATION(S)    |                                     |               |     |
| FILTER PACK TYPE           | Colorado Silica Sand                |               |     |
| GRADUATION                 | 10 X 20                             |               |     |

|           |                           |
|-----------|---------------------------|
| SEALS (S) |                           |
| SURFACE   | Concrete                  |
| ANNULAR   | Bentonite                 |
| BACKFILL  | Bentonite Chips-hole plug |

|               |               |
|---------------|---------------|
| MATERIAL TYPE |               |
| Concrete      | 3 60 lb bags  |
| Bentonite     | 3 50 lb bags  |
| Sand          | 14 50 lb bags |

|                |        |
|----------------|--------|
| NOTES          |        |
| Start Card # : | 150066 |
| Well Tag #:    | L58162 |
| Drums:         | 2      |





PROJECT NUMBER  
165241.RR.01

BORING NUMBER  
MW-23S

SHEET 1 OF 1

## SOIL BORING LOG

PROJECT NAME : Taylor Lumber -Phase 2 Field Investigation

LOCATION : Sheridan, OR

LOGGER: Rob Healy

START DATE: 7/29/02 10:00

DRILLING METHOD: 6 5/8" Hollow Stem Auger

FINISH DATE: 7/29/02 11:30

DRILLING CONTRACTOR : GeoTech Explorations

WATER LEVELS:

| DEPTH BELOW<br>SURFACE (FT) | SAMPLE   |                    |                  | STANDARD                               | SOIL DESCRIPTION<br><br>SOIL NAME, USCS GROUP SYMBOL, COLOR,<br>MOISTURE CONTENT, RELATIVE DENSITY,<br>OR CONSISTENCY, SOIL STRUCTURE,<br>MINERALOGY. | COMMENTS<br><br>DEPTH OF CASING, DRILLING RATE<br>DRILLING FLUID LOSS<br>TESTS AND INSTRUMENTATION |
|-----------------------------|----------|--------------------|------------------|--|---|--|
|                             | INTERVAL | NUMBER<br>AND TYPE | RECOVERY<br>(FT) | PENETRATION                            |   |  |
|                             |          |                    |                  | TEST<br>RESULTS<br><br>6"-6"-6"<br>(N) |   |  |
| 5                           | 1.5      |                    | 0.5              | 7-12-11                                | Fill<br>Light brown silt, dry, wood particles,<br>loose(ML).  | PID=57ppm  |
|                             | 1.5      |                    | 0.3              | 6-8-9                                  | Same(ML).   | PID=n/a  |
|                             | 1.5      |                    | 0.5              | 10-17-15                               | Same.   | PID=29   |
|                             | 1.5      |                    | 1                | 3-8-7                                  | Light brown silt, moist, some clay, rust<br>staining. Stiff, low to medium plasticity.  | PID=110  |
|                             | 1.5      |                    | 0.5              | 5-13-15                                | Same.<br>1"-silty sand gravel, moist.   | PID=21ppm  |
| 10                          | 1.5      |                    | 0.6              | 12-17-24                               | Silty sandy gravel. Moist, fine sands. Sub-<br>angular to angular. Light brown.   | PID=10   |
|                             | 1.5      |                    | 1.5              | 10-50(6)                               | Brown silt. Moist. True gravel. Medium<br>plasticity.   | Silt may be slough.  |
|                             | 1.5      |                    | 6                | 13-30-24                               | 4"-silt & 2" gravel.<br>2" gravel. Trace silt. Basalt gravel,<br>angular.   |  |
| 15                          | 1.5      |                    | 1                | 20-28-34                               | Olive gray gravel with silt & sand. Fine<br>sand. 1" minus sub-angular gravel. Wet.   | PID=6.0  |
|                             | 1.5      |                    | 0.2              | 13-50(6)                               | 3" cobble in shoe.  | Drill encountered siltstone @ 15'.   |
|                             | 1.5      |                    | 0.5              | 13-50(3)                               | Siltstone. Dark gray, dry, hard.  |  |
| 20                          |          |                    |                  |  |   |  |
| 25                          |          |                    |                  |  |   |  |



|   |                        |              |
|---|------------------------|--------------|
| PROJECT NUMBER<br>165241.AN.01                    | WELL NUMBER<br>MW-101S | SHEET 1 OF 1 |
| MONITORING WELL RECORD DRAWING & CONSTRUCTION LOG |                        |              |

|                       |                          |              |              |                                  |         |
|-----------------------|--------------------------|--------------|--------------|----------------------------------|---------|
| PROJECT NAME:         | Taylor Lumber            | LOCATION :   | Sheridan, OR | ELEV, NGVD (Top of Well Casing): | 206.976 |
| FIELD OBSERVERS:      | Michael Niemet           | START DATE:  | 07/31/2002   | SURFACE ELEV, NGVD:              | 207.230 |
| DRILLING METHOD:      | 8 1/4" Hollow Stem Auger | FINISH DATE: | 07/31/2002   | NORTHING:                        | 8277.95 |
| DRILLING CONTRACTOR : | GeoTech Explorations     | EASTING:     | 9582.60      |                                  |         |

#### WELL CONSTRUCTION MATERIALS

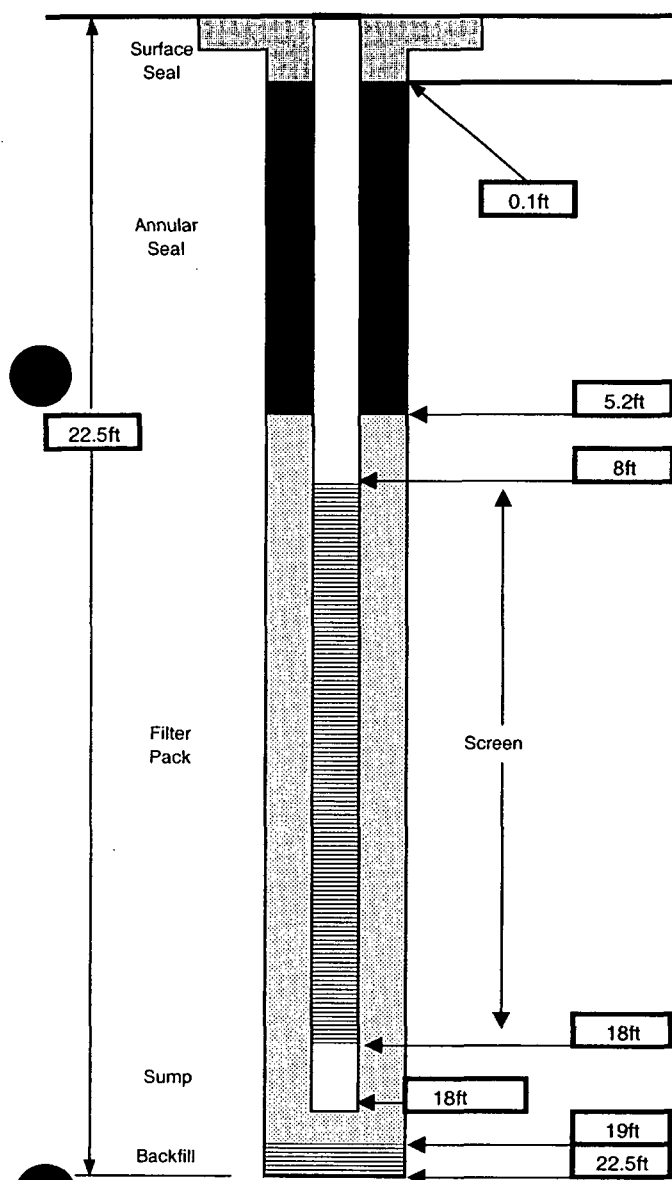
|                 |    |            |      |        |
|-----------------|----|------------|------|--------|
| BOREHOLE DIA(S) | 12 | INCHES TO: | 22.5 | FT BGS |
|                 |    | INCHES TO: |      | FT BGS |
|                 |    | INCHES TO: |      | FT BGS |

|                            |                                |               |     |
|----------------------------|--------------------------------|---------------|-----|
| PROTECTIVE CASING TYPE     | Flushmount vault               |               |     |
| PROTECTIVE CASING DIAMETER |                                |               |     |
| WELL CASING TYPE           | Stainless steel                | DIAMETER      | 4"  |
| COUPLING TYPE              | Threaded                       |               |     |
| SCREEN TYPE                | Stainless steel-vee wire       | DIAMETER      | 4"  |
| SLOT SIZE                  | 0.010"                         | SCREEN LENGTH | 11' |
| TOP CAP TYPE               | J-plug                         |               |     |
| END CAP/PLUG TYPE          | Flat-extends 1/2" below screen |               |     |
| CENTRALIZER TYPE           |                                |               |     |
| CENTRALIZER LOCATION(S)    |                                |               |     |
| FILTER PACK TYPE           | Colorado Silica Sand           |               |     |
| GRADUATION                 | 10 X 20                        |               |     |

|           |                           |
|-----------|---------------------------|
| SEALS (S) |                           |
| SURFACE   | Concrete                  |
| ANNULAR   | Bentonite                 |
| BACKFILL  | Bentonite Chips-hole plug |

|               |               |
|---------------|---------------|
| MATERIAL TYPE | QUANTITY      |
| Concrete      | 60 lb bags    |
| Bentonite     | 5 50 lb bags  |
| Sand          | 24 50 lb bags |

|                |        |
|----------------|--------|
| NOTES          |        |
| Start Card # : | 150076 |
| Well Tag #:    | L58171 |
| Drums:         | 4      |



**CH2MHILL**

PROJECT NUMBER

165241.RR.01

BORING NUMBER

MW-101S(overdrill)

1 of 1

## SOIL BORING LOG

PROJECT NAME : Taylor Lumber -Phase 2 Field Investigation

LOCATION : Sheridan, OR

LOGGER: Michael Niemet

START DATE: 7/31/02 15:45

DRILLING METHOD: 8 1/4" Hollow Stem Auger

FINISH DATE: 7/31/02 16:45

DRILLING CONTRACTOR : GeoTech Explorations

WATER LEVELS:

| DEPTH BELOW<br>SURFACE (FT) | SAMPLE   |                    |                  | STANDARD                           | SOIL DESCRIPTION  | COMMENTS |
|-----------------------------|----------|--------------------|------------------|------------------------------------|---|----------|
|                             | INTERVAL | NUMBER<br>AND TYPE | RECOVERY<br>(FT) | PENETRATION                        |   |          |
|                             |          |                    |                  | TEST<br>RESULTS<br>6"-6"-6"<br>(N) |   |          |
| 5                           |          |                    |                  |                                    | Step #1-Broke out concrete<br>-Broke up vault<br>-Pulled well<br>-Lower 10 feet<br>obviously contaminated<br>well screen shimmering w/product |          |
| 10                          |          |                    |                  |                                    |   |          |
| 15                          |          |                    |                  |                                    |   |          |
| 20                          |          |                    |                  |                                    | Contaminated(oily).<br>Paste cuttings apparent.<br><br>Drilled to 22.5 feet.  |          |
| 25                          |          |                    |                  |                                    | -The last auger flight was covered in<br>creosote upon removal. Dripping black oil.   |          |



|                                       |                                      |                     |
|---------------------------------------|--------------------------------------|---------------------|
| <b>PROJECT NUMBER</b><br>165241.AN.01 | <b>BORING NUMBER</b><br><b>GP-01</b> | <b>SHEET 1 OF 1</b> |
|---------------------------------------|--------------------------------------|---------------------|

## SOIL BORING LOG

|   |                                    |
|---|------------------------------------|
| <b>PROJECT NAME :</b> Taylor Lumber - Phase 2 Field Investigation | <b>LOCATION :</b> Sheridan, OR     |
| <b>LOGGER:</b> Rob Healy  | <b>START DATE:</b> 7/31/02 10:20   |
| <b>DRILLING METHOD:</b> Geoprobe - Track Rig                      | <b>FINISH DATE:</b> 7/31/02 11:15  |
| <b>DRILLING CONTRACTOR :</b> GeoTech Explorations                 | <b>WATER LEVELS:</b> 4.36 at 13:50 |

| DEPTH BELOW SURFACE (FT)   | SAMPLE   |                 |               | STANDARD     | SOIL DESCRIPTION   | COMMENTS   |
|--|----------|-----------------|---------------|--------------|--|--|
|  | INTERVAL | NUMBER AND TYPE | RECOVERY (FT) | PENETRATION  | SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY. | DEPTH OF CASING, DRILLING RATE<br>DRILLING FLUID LOSS<br>TESTS AND INSTRUMENTATION |
|  |          |                 |               | TEST RESULTS |  |  |
|  |          |                 |               | 6"-6"-6" (N) |  |  |
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|          |                 |               |              |  |  |



PROJECT NUMBER

165241.AN.01

BORING NUMBER

GP-02

SHEET 1 OF 1

# SOIL BORING LOG

PROJECT NAME : Taylor Lumber - Phase 2 Field Investigation

LOCATION : Sheridan, OR

LOGGER: Rob Healy

START DATE: 7/31/02 9:00

DRILLING METHOD: Geoprobe - Track Rig

FINISH DATE: 7/31/02 10:00

DRILLING CONTRACTOR : GeoTech Explorations

WATER LEVELS: 4.46 at 13:47

| DEPTH BELOW SURFACE (FT) | SAMPLE   |                 |               | STANDARD                 | SOIL DESCRIPTION  | COMMENTS   |
|--------------------------|----------|-----------------|---------------|--------------------------|---|--|
|                          | INTERVAL | NUMBER AND TYPE | RECOVERY (FT) | PENETRATION TEST RESULTS | SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.      | DEPTH OF CASING, DRILLING RATE<br>DRILLING FLUID LOSS<br>TESTS AND INSTRUMENTATION                         |
|                          |          |                 |               | 6"-6"-6" (N)             |   |  |
| 5                        | 5        |                 | 4             |                          | Silty gravel (GM) light brown, dry  | PID = 60 ppm. No visible contamination, no odors off cuttings Taking composite sample from 0' to 5' 9:07am |
|                          |          |                 |               |                          | Clay (CL) olive gray, stiff, plastic, moist, trace gravels  |  |
| 10                       | 5        |                 | 5             |                          | Silty sandy gravel (GM) light brown, moist, 1 inch minus subangular gravel, fine to medium sand                           | PID = 28 ppm   |
|                          |          |                 |               |                          | last 6 inches are wet   |  |
| 15                       | 5        |                 | 5             |                          | Clay (CL) olive gray, stiff, plastic, moist   | PID = 50 ppm   |
|                          |          |                 |               |                          | Silty sandy gravel (GM) light brown, moist, 1/4 inch minus  |  |
|                          |          |                 |               |                          | Silty sandy gravel (GM) light brown, wet, 1/4 inch minus  |  |
| 20                       | 5        |                 | 0.5           |                          | Silty sandy gravel (GM) light brown, moist, 1/4 inch minus<br>Silty sandy gravel (GM) brown, moist to wet, 1/2 inch minus | Siltstone jammed in sample tube, unable to slide liner out<br>No headspace taken                           |
|                          |          |                 |               |                          | Driller noted siltstone at 18'  |  |
| 25                       |          |                 |               |                          | End of Boring at 20ft   | Screen set from 14' to 18'<br>Very little water available<br>Setting temporary well in geoprobe hole       |
|                          |          |                 |               |                          |   |  |





**CH2MHILL**

**PROJECT NUMBER**

165241.AN.01

**BORING NUMBER**

**GP-03**

SHEET 1 OF 1

**SOIL BORING LOG**

**PROJECT NAME :** Taylor Lumber - Phase 2 Field Investigation

**LOCATION :** Sheridan, OR

**LOGGER:** Rob Healy

**START DATE:** 7/31/02 16:50

**DRILLING METHOD:** Geoprobe - Track Rig

**FINISH DATE:** 7/31/02 17:20

**DRILLING CONTRACTOR :** GeoTech Explorations

**WATER LEVELS:**

| DEPTH BELOW<br>SURFACE (FT) | SAMPLE   |                    |                  | STANDARD        | SOIL DESCRIPTION  | COMMENTS   |
|-----------------------------|----------|--------------------|------------------|-----------------|---|--|
|                             | INTERVAL | NUMBER<br>AND TYPE | RECOVERY<br>(FT) | PENETRATION     | SOIL NAME, USCS GROUP SYMBOL, COLOR,<br>MOISTURE CONTENT, RELATIVE DENSITY,<br>OR CONSISTENCY, SOIL STRUCTURE,<br>MINERALOGY. | DEPTH OF CASING, DRILLING RATE<br>DRILLING FLUID LOSS<br>TESTS AND INSTRUMENTATION |
|                             |          |                    |                  | TEST<br>RESULTS |   |  |
|                             |          |                    |                  | 6"-6"-6"<br>(N) |   |  |
| 5                           | 5        |                    | 4                |                 | Silt and gravel, dry  | PID = 9 ppm  |
|                             |          |                    |                  |                 | Clay (CL) olive gray, medium stiff,<br>plastic, moist   |  |
| 10                          | 5        |                    | 5                |                 | Clay (CL) light brown, moist, softer than<br>above  | PID = 11 ppm   |
|                             |          |                    |                  |                 | Silty sandy gravel (GM) light brown,<br>moist to wet  |  |
| 15                          | 5        |                    | 5                |                 | Silty sandy gravel (GM) light brown, wet,<br>1/4 inch minus subangular gravel, fine<br>sands                                  | PID = 2 ppm  |
|                             |          |                    |                  |                 | Silty sandy gravel (GM) light brown, wet,<br>1/4 inch minus subangular gravel, fine<br>sands                                  |  |
| 20                          | 5        |                    | 4                |                 | Siltstone, dry  | PID = 0 ppm  |
|                             |          |                    |                  |                 | End of Boring at 20ft   |  |
| 25                          |          |                    |                  |                 |   |  |

**CH2MHILL****PROJECT NUMBER**

165241.AN.01

**BORING NUMBER****GP-04**

SHEET 1 OF 1

**SOIL BORING LOG****PROJECT NAME :** Taylor Lumber - Phase 2 Field Investigation**LOCATION :** Sheridan, OR**LOGGER:** Rob Healy**START DATE:** 7/31/02 16:15**DRILLING METHOD:** Geoprobe - Track Rig**FINISH DATE:** 7/31/02 16:40**DRILLING CONTRACTOR :** GeoTech Explorations**WATER LEVELS:**

| DEPTH BELOW<br>SURFACE (FT) | SAMPLE   |                    |                  | STANDARD<br>PENETRATION<br>TEST<br>RESULTS<br><br>6"-6"-6"<br>(N) | SOIL DESCRIPTION<br><br>SOIL NAME, USCS GROUP SYMBOL, COLOR,<br>MOISTURE CONTENT, RELATIVE DENSITY,<br>OR CONSISTENCY, SOIL STRUCTURE,<br>MINERALOGY.   | COMMENTS<br><br>DEPTH OF CASING, DRILLING RATE<br>DRILLING FLUID LOSS<br>TESTS AND INSTRUMENTATION |
|-----------------------------|----------|--------------------|------------------|---|---|--|
|                             | INTERVAL | NUMBER<br>AND TYPE | RECOVERY<br>(FT) |   |   |  |
|                             |          |                    |                  |   |   |  |
| 5                           | 5        |                    | 0                |   | No recovery   | PID = NA   |
| 10                          | 5        |                    | 5                |   | Clay (CL) olive gray, medium stiff,<br>plastic, moist<br><br>grades to Clay (CL) light brown, moist,<br>plastic, medium stiff<br>Clay with silt, light brown, moist, plastic,<br>medium stiff | PID = 0 ppm  |
| 15                          | 5        |                    | 5                |   | Silty sand (SM) dark gray, fine sands,<br>wet, loose<br><br>Silty sandy gravel (GM) 1/2 inch minus<br>subangular gravel, fine sands   | PID = 0.4 ppm<br>Screened from 10' to 15'  |
| 20                          | 3.5      |                    | 3.5              |   | Siltstone   | PID = NA   |
| 25                          |          |                    |                  |   | End of Boring at 18.5ft   |  |



|                                |                        |              |
|--------------------------------|------------------------|--------------|
| PROJECT NUMBER<br>165241.AN.01 | BORING NUMBER<br>GP-05 | SHEET 1 OF 1 |
|--------------------------------|------------------------|--------------|

## SOIL BORING LOG

|                       |   |               |               |
|-----------------------|---|---------------|---------------|
| PROJECT NAME :        | Taylor Lumber - Phase 2 Field Investigation | LOCATION :    | Sheridan, OR  |
| LOGGER:               | Rob Healy                                   | START DATE:   | 7/31/02 15:25 |
| DRILLING METHOD:      | Geoprobe - Track Rig                        | FINISH DATE:  | 7/31/02 15:55 |
| DRILLING CONTRACTOR : | GeoTech Explorations                        | WATER LEVELS: |               |

| DEPTH BELOW SURFACE (FT) | SAMPLE   |                 |               | STANDARD     | SOIL DESCRIPTION  | COMMENTS   |
|--------------------------|----------|-----------------|---------------|--------------|---|--|
|                          | INTERVAL | NUMBER AND TYPE | RECOVERY (FT) | PENETRATION  | SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.  | DEPTH OF CASING, DRILLING RATE<br>DRILLING FLUID LOSS<br>TESTS AND INSTRUMENTATION |
|                          |          |                 |               | TEST RESULTS |   |  |
|                          |          |                 |               | 6"-6"-6" (N) |   |  |
| 5                        | 5        |                 | 3.5           |              | Silty sandy gravel (GM) dark gray, dry, 1/4 inch minus subangular   | PID = 5 ppm  |
|                          |          |                 |               |              | Clay (CL) dark gray, moist, soft  |  |
| 10                       | 5        |                 | 4             |              | Clay (CL) dark gray, moist, soft  | PID = 6 ppm  |
|                          |          |                 |               |              | Clay with silt, light brown, soft, plastic, trace gravel  |  |
| 15                       | 5        |                 | 5             |              | Silty sandy gravel (GM) wet, 1/4 inch minus gravel<br>Silty sandy gravel (GM) wet, 1/4 inch minus gravel, wet   | PID = 3.2 ppm  |
|                          |          |                 |               |              | Silty sandy gravel (GM) wet, 1/4 inch minus gravel, dry<br>Silty sandy gravel (GM) wet, 1/4 inch minus gravel, moist<br>Silty sandy gravel (GM) wet, 1/4 inch minus gravel, wet | Screened from 9' to 14'  |
| 20                       | 5        |                 | 5             |              | Siltstone, dry  |  |
| 25                       |          |                 |               |              | End of Boring at 20ft   |  |



PROJECT NUMBER

165241.AN.01

BORING NUMBER

GP-06

SHEET 1 OF 1

# SOIL BORING LOG

PROJECT NAME : Taylor Lumber - Phase 2 Field Investigation

LOCATION : Sheridan, OR

LOGGER: Rob Healy

START DATE: 7/31/02 14:45

DRILLING METHOD: Geoprobe - Track Rig

FINISH DATE: 7/31/02 15:10

DRILLING CONTRACTOR : GeoTech Explorations

WATER LEVELS:

| DEPTH BELOW<br>SURFACE (FT) | SAMPLE   |                    |                  | STANDARD<br>PENETRATION<br>TEST<br>RESULTS<br><br>6"-6"-6"<br>(N) | SOIL DESCRIPTION  | COMMENTS   |
|-----------------------------|----------|--------------------|------------------|---|---|--|
|                             | INTERVAL | NUMBER<br>AND TYPE | RECOVERY<br>(FT) |   | SOIL NAME, USCS GROUP SYMBOL, COLOR,<br>MOISTURE CONTENT, RELATIVE DENSITY,<br>OR CONSISTENCY, SOIL STRUCTURE,<br>MINERALOGY. | DEPTH OF CASING, DRILLING RATE<br>DRILLING FLUID LOSS<br>TESTS AND INSTRUMENTATION |
|                             |          |                    |                  |   |   |  |
| 5                           | 5        |                    | 4                |   | Clay (CL) olive gray, moist, medium stiff, plastic  | PID = 4.2 ppm  |
|                             |          |                    |                  |   | Clay (CL) with silt, light brown, moist, plastic, soft  |  |
|                             |          |                    |                  |   | Clay (CL) olive gray, moist, medium stiff, plastic  |  |
| 10                          | 5        |                    | 5                |   | Silty sandy gravel (GM) gray, dry   | PID = 5 ppm  |
|                             |          |                    |                  |   | Silty sandy gravel (GM) light brown, moist  |  |
|                             |          |                    |                  |   | Silty sandy gravel (GM) light brown, wet  |  |
| 15                          | 5        |                    | 4.5              |   | Silty sandy gravel (GM) light brown, wet  | PID = 2.5 ppm<br>Temporary well from 9' to 14'                                     |
|                             |          |                    |                  |   | Siltstone   |  |
|                             |          |                    |                  |   | End of Boring at 15ft   |  |
| 20                          |          |                    |                  |   |   |  |
| 25                          |          |                    |                  |   |   |  |

**CH2MHILL****PROJECT NUMBER**

165241.AN.01

**BORING NUMBER****GP-07**

SHEET 1 OF 1

**SOIL BORING LOG****PROJECT NAME :** Taylor Lumber - Phase 2 Field Investigation**LOCATION :** Sheridan, OR**LOGGER:** Rob Healy**START DATE:** 7/31/02 14:00**DRILLING METHOD:** Geoprobe - Track Rig**FINISH DATE:** 7/31/02 14:30**DRILLING CONTRACTOR :** GeoTech Explorations**WATER LEVELS:**

| DEPTH BELOW<br>SURFACE (FT) | SAMPLE   |                    |                  | STANDARD                       | SOIL DESCRIPTION  | COMMENTS   |              |
|-----------------------------|----------|--------------------|------------------|--------------------------------|---|--|--------------|
|                             | INTERVAL | NUMBER<br>AND TYPE | RECOVERY<br>(FT) | PENETRATION<br>TEST<br>RESULTS | SOIL NAME, USCS GROUP SYMBOL, COLOR,<br>MOISTURE CONTENT, RELATIVE DENSITY,<br>OR CONSISTENCY, SOIL STRUCTURE,<br>MINERALOGY. | DEPTH OF CASING, DRILLING RATE<br>DRILLING FLUID LOSS<br>TESTS AND INSTRUMENTATION |              |
|                             |          |                    |                  | 6"-6"-6"<br>(N)                |   |  |              |
| 5                           | 5        |                    | 3                |                                | Silt and gravel, brown, 1/2 inch minus<br>subangular gravel, dry  | PID = 18 ppm   |              |
|                             |          |                    |                  |                                | Clay (CL) olive gray, moist, medium stiff<br>Clay (CL) light brown, moist   |  |              |
|                             | 5        |                    | 3                |                                | Silty clay, light brown, moist, soft  |  | PID = 35 ppm |
|                             |          |                    |                  |                                | Silty sandy gravel (GM) moist, 1/4 inch<br>minus subrounded   |  |              |
| 10                          | 5        |                    | 5                |                                | Silty sandy gravel (GM) wet, 1/4 inch<br>minus subrounded gravel, medium to fine<br>sand, wet                                 | PID = 7 ppm<br><br>Screen set from 10.5' to 15.5'                                  |              |
|                             |          |                    |                  |                                | 5   |  |              |
| 20                          |          |                    |                  |                                | End of Boring at 20ft   |  |              |
| 25                          |          |                    |                  |                                |   |  |              |

**CH2MHILL****PROJECT NUMBER**

165241.AN.01

**BORING NUMBER****GP-08**

SHEET 1 OF 1

**SOIL BORING LOG****PROJECT NAME :** Taylor Lumber - Phase 2 Field Investigation**LOCATION :** Sheridan, OR**LOGGER:** Rob Healy**START DATE:** 7/31/02 13:15**DRILLING METHOD:** Geoprobe - Track Rig**FINISH DATE:** 7/31/02 13:45**DRILLING CONTRACTOR :** GeoTech Explorations**WATER LEVELS:**

| DEPTH BELOW SURFACE (FT) | SAMPLE   |                 |               | STANDARD PENETRATION TEST RESULTS<br>6"-6"-6" (N) | SOIL DESCRIPTION  | COMMENTS   |
|--------------------------|----------|-----------------|---------------|---|---|--|
|                          | INTERVAL | NUMBER AND TYPE | RECOVERY (FT) |   |   |  |
|                          |          |                 |               |   |   |  |
| 5                        | 5        |                 | 4             |   | Silt (ML) dark brown, light organic roots, soft, moist                              | PID = 115 ppm. No visible contamination, organic color |
|                          |          |                 |               |   | Clay (CL) light brown to olive gray, moist, plastic, medium stiff                   |  |
| 10                       | 5        |                 | 5             |   | Clay (CL) brown, moist, medium stiff, gets softer with depth                        | PID = 9 ppm  |
|                          | 5        |                 | 5             |   | Clay (CL) brown, moist, medium stiff, gets softer with depth                        | PID = 3 ppm  |
| 15                       |          |                 |               |   | Sand (SD) brown, fine, moist, loose   | Set temporary well screen from 13' to 18'              |
|                          |          |                 |               |   | Silty sandy gravel (GM) light brown, 1/4 inch minus subangular gravel, moist to wet |  |
|                          | 5        |                 | 5             |   | Silty sandy gravel (GM) light brown, 1/4 inch minus subrounded gravel, wet          | PID = 3 ppm  |
| 20                       |          |                 |               |   | Siltstone   |  |
| 25                       |          |                 |               |   | End of Boring at 20ft   |  |



**CH2MHILL**

**PROJECT NUMBER**

165241.AN.01

**BORING NUMBER**

**GP-09**

SHEET 1 OF 1

**SOIL BORING LOG**

**PROJECT NAME :** Taylor Lumber - Phase 2 Field Investigation

**LOCATION :** Sheridan, OR

**LOGGER:** Rob Healy

**START DATE:** 7/31/02 11:30

**DRILLING METHOD:** Geoprobe - Track Rig

**FINISH DATE:** 7/31/02 12:00

**DRILLING CONTRACTOR :** GeoTech Explorations

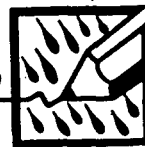
**WATER LEVELS:** 3.36 at 13:55

| DEPTH BELOW<br>SURFACE (FT) | SAMPLE   |                    |                  | STANDARD                       | SOIL DESCRIPTION  | COMMENTS   |
|-----------------------------|----------|--------------------|------------------|--------------------------------|---|--|
|                             | INTERVAL | NUMBER<br>AND TYPE | RECOVERY<br>(FT) | PENETRATION<br>TEST<br>RESULTS | SOIL NAME, USCS GROUP SYMBOL, COLOR,<br>MOISTURE CONTENT, RELATIVE DENSITY,<br>OR CONSISTENCY, SOIL STRUCTURE,<br>MINERALOGY. | DEPTH OF CASING, DRILLING RATE<br>DRILLING FLUID LOSS<br>TESTS AND INSTRUMENTATION |
|                             |          |                    |                  | 6"-6"-6"<br>(N)                |   |  |
| 5                           | 5        |                    | 4                |                                | Silt with gravel (ML) brown, dry, 1/4 inch gravel   | PID = 5 ppm  |
|                             |          |                    |                  |                                | Clay (CL) olive gray, trace gravel, moist, stiff<br>Clay (CL) olive gray, trace gravel, moist, stiff                          |  |
| 10                          | 5        |                    | 5                |                                | grades to Clay (CL) light brown, moist, softer than above   | PID = 5 ppm  |
|                             |          |                    |                  |                                | Clay (CL) olive gray, moist, stiff, plastic   |  |
| 15                          | 5        |                    | 5                |                                | grades to Silt with clay (ML) light brown, soft, slight plasticity  | PID = 5 ppm  |
|                             |          |                    |                  |                                | Silt (ML) dark gray, moist  |  |
| 20                          |          |                    |                  |                                | Driller noted siltstone around 20'  | No recovery<br>PID = NA<br>Setting well from 14' to 19'                            |
|                             |          |                    |                  |                                | End of Boring at 20ft   |  |
| 25                          |          |                    |                  |                                |   |  |

Attachment B-3  
Field Notes



"Rite in the Rain®"



ALL-WEATHER  
**LINE RULE**

Notebook No. 391

Taylor Lumber & Treating

Proj #

7/29/02 - 8/1/02

Bruce Pratt / CH2M Hill

Ditch Sampling,

7/29/02 B. Paetz

Note: All DS samples  
sampled for SVOC's & metals  
metals = LMO4.1  
svoc's = OLMO4.2  
dioxins = OLMO1.4 or SW8290  
collected in clear 802  
glass jars  
dioxins collected in 802 amber

↻ glass jars

Method / Equipment ↻

Sample location broken up w/  
3/8" rebar, scooped w/ SS spoon  
into plastic tub, homogenized  
and placed into jar(s)  
spoon, rebar, gloves, plastic tub disposed.

Samples labeled and placed  
on ice

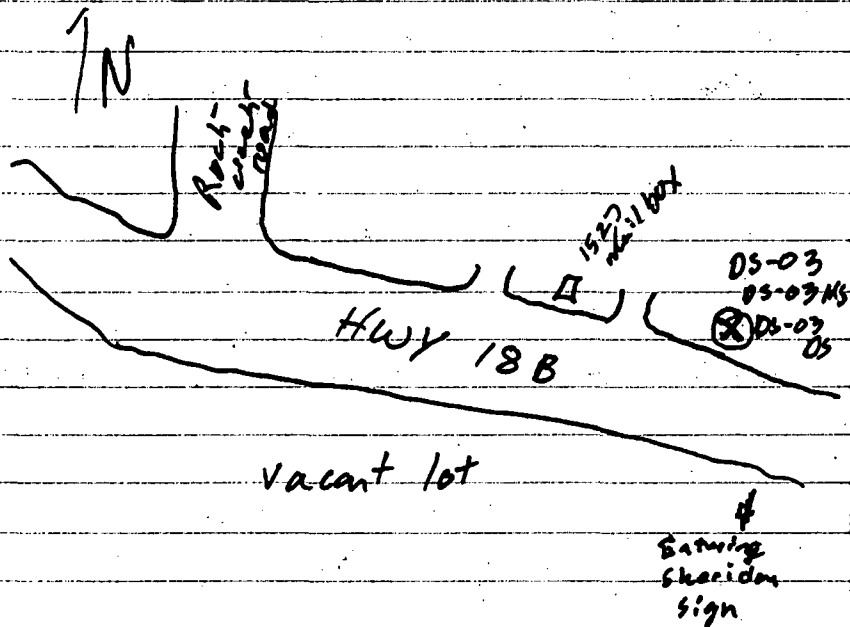
7/29/02

B. Pratt

→ DS-08 @ 16:50, mids, suoc  
 50' N of culvert  
 across i. south of manhole  
 woody/silty, dry light brown  
 See map on p.7 E side of road  
 [Cdp# = JOLM2; Epa# = 02314405]

→ DS-12 @ 17:10 Digging, mids, suoc  
 30' S of culvert @  
 main gate see p.7 map  
 W side of road, wet moist  
 silt, brown  
 [Cdp# = JOLM3; Epa# = 02314407]

→ DS-09 @ 17:40 mids, suoc  
 27' N of culvert on  
 E side of road close to  
 power pole. med brown  
 dry soil. See map p.7  
 [Cdp# = JOLM4; Epa# = 02314408]



7/30/02 B. Pratt

→ DS-03 @ 10:40

Dry light brown silt, top 2"  
of sediment in btm of ditch  
9' E of culvert in front of  
1527 residence blue/white  
house directly across  
from 'Entering Sheridan' sign

[EPA# 02314411, JOLM 7-BNA, MJO69 mt]

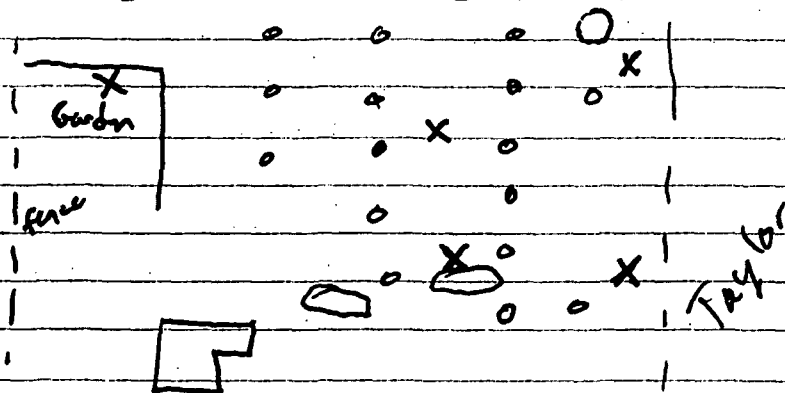
→ DS-03 MS/MSD @ 10:40

[EPA# 02314411, JOLM 7-BNA, MJO69 mt]

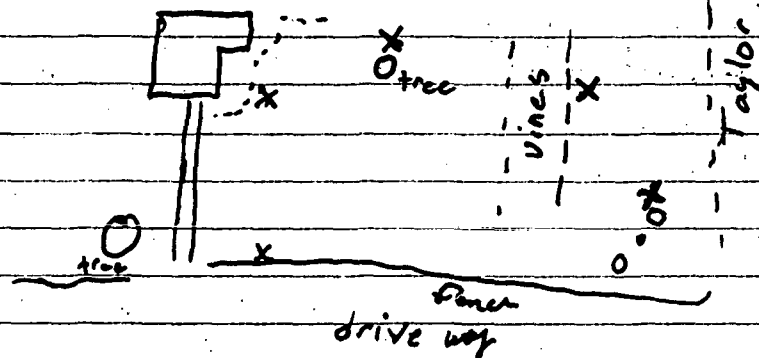
→ DS-03 MS/MSD @ 10:40

[EPA# 02314411, JOLM 7-BNA, MJO69 mt]

↑ RES-01B @ 14:15  
N Bowman residence



↑ N  
RES-01A composite locations  
Bowman residence



7/30/02 R. Strauss / B. Pratt

→ RES-01A @ 14:00

light brown dry silt/loam w/ organics  
sample collected w/ clean SS trowel  
composited in plastic tub  
and distributed to  
2 - 8oz clear glass jars  
see composite locations on map  
metals & SVOCs [EPA # 02314416, JOLN2-BWA, MJOM74-204]  
LL PAH [EPA # 02314416]

→ RES-01B @ 14:15

light brown dry silt/loam w/  
organics. SS trowel, plastic bag  
2 clear 8oz glass & 1 8oz amber  
glass jars  
metals & SVOCs jar  
[EPA # 02314417, JOLN3-BWA, MJOM75-204]  
LL PAHs [EPA # 02314417]  
dioxin [EPA # 02314417]

See p. 18  
for map

7/30/02 R. Strass/B. Platt

RES-03 B @ 16:30

Taken from areas South  
and East of RES-03 A  
in horse pastures

Light brown silt w/ organics

metals & svocs [EPA # 02341121]

JOLN7-SNA

MJOM79 - total metals

LL PAH [EPA # 02314421]

See map on p. 18

7/31/02

B. Platt

Health &amp; Safety

GP-02

ppm

B2

down hole

head space

depth

0

0

60

0-5'

0

0

28

5-10'

0

-

50

10-15'

15-20'

15-20' head space unavailable  
hit sand stone @ 18' jammed  
liantube.

7/31/02

B. Platt

Soil sample collected

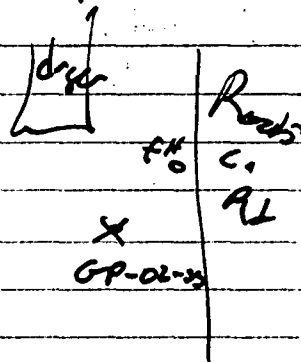
→ GP-02-SS 0'-5' @ 9:07

60 ppm headspace reading

[EPA# 02314425; JOLPI-BNA; MSDM83]  
total metal

75' S of dryer, 20' W of  
fence, SW of fire hydrant

retards



7/31/01 B. Patt

GP-09

| BZ | downhole | head<br>space | depth  |
|----|----------|---------------|--------|
| 0  | 0        | 5             | 0-5'   |
| -  | -        | 5             | 5-10'  |
| 0  | 1        | 5             | 10-15' |
| -  | -        | NA            | 15-20' |

Siltstone ~ 20' (driller's estimate)

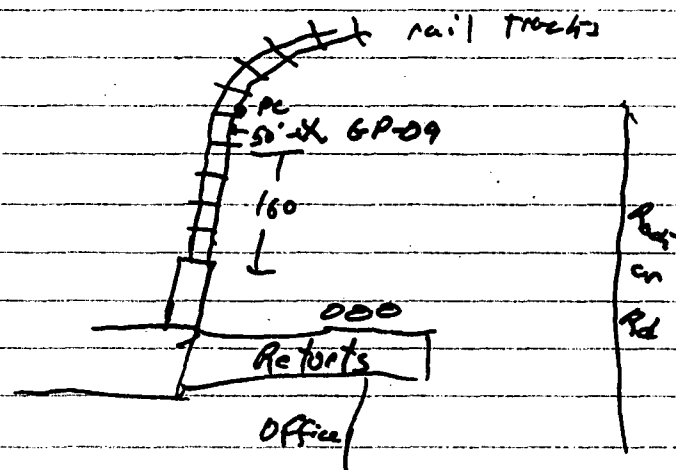
7/31/02

B. Patt

GP-09

30' E of rail road tracks  
 150' N of rail shed  
 that intersects rector tracks

↑ N



No soil sample



GP-07

| BZ | down<br>hole | hand<br>space pm | depth |
|----|--------------|------------------|-------|
| 0  | 0            | 18               | 0-5   |
| -  | -            | 35 & ↑ slowly    | 5-10  |
| 0  | 0            | 7                | 10-15 |
| -  | -            | NA               | 15-20 |

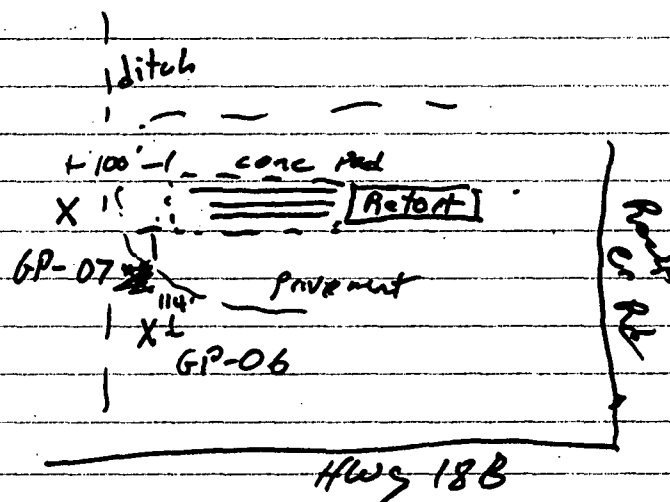
siltstone @ 16'

7/31/02

B. Pratt

GP-07

No soil sampler



GP-05

| BZ | down hole | head space (ppm) | depth  |
|----|-----------|------------------|--------|
| -  | -         | 5                | 0-5'   |
| 0  | 0.3       | 6.4              | 5-10'  |
| 0  | 0         | 3.2              | 10-15' |
| 0  | 0         | NA               | 15-20' |

silt store @ 15.5'

7/31/02

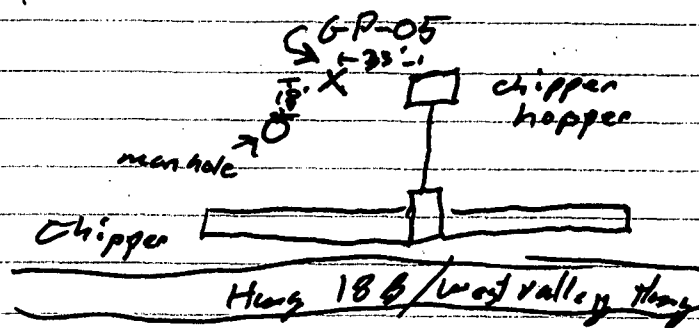
B. Pratt

GP-05

33' W of chipper hopper conc pad &amp; 18' N of man hole

No soil samples

↑ N



GP-03

| BZ | down<br>hole | head<br>space | depth  |
|----|--------------|---------------|--------|
| 0  | 0.3          | 9             | 0-5'   |
| 0  | 3.4          | 11            | 5-10'  |
| 0  | 0            | 2             | 10-15' |
| 0  | 0            | 0             | 15-20' |

Siltstone @ 17.5'

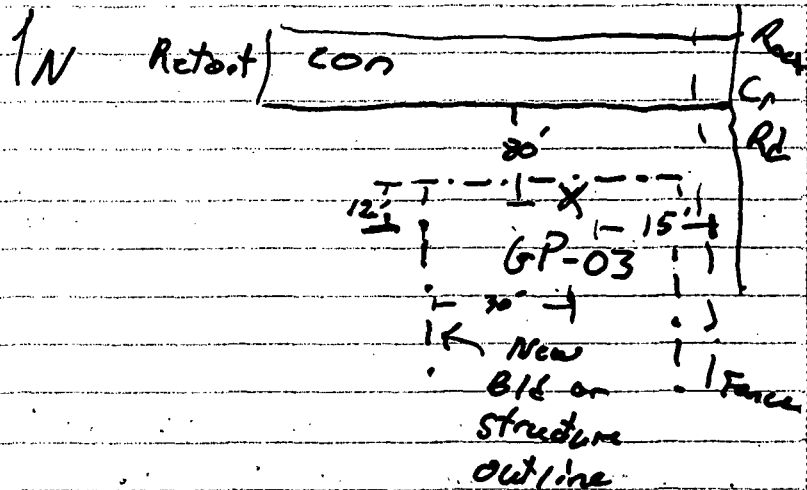
7/31/02

B. Prott

GP-03

No Samples taken

45 W of Fence along  
Rocks Creek Road, 80' south  
of concrete retort pad.  
15' S of N edge of building (3)  
that is under construction



250' S of RR

100' W of fence

8/1/02

B. Pratt

→ WF-05A @ 9:26 (0-6")

BZ = 0.2, down hole = 1

[EPA # 02314433, JOLP5-BNA, MJOM87  
total metals]

1-8oz clear glass metals &amp; succs

1-8oz amber glass dioxins/furans

→ WF-DUP2

same location as WF-05A (upper 6")

metal time @ 9:26 recorded as 11:45

[EPA # 02314434]

1-8oz amber glass dioxin dup

→ WF-05L @ 9:26 (lower 0-2')

BZ = 0.2, down hole = 1

PID

MJOM88

[EPA # 02314435, JOLP6-BNA, MJOM88  
total metals]

1-8oz clear glass metals &amp; succs

1-8oz clear glass dioxin

dioxin dup lower

→ WF-DUP3 (lower 0-2')

same location as WF-05

Time actual = 9:26, recorded as 12:15

[EPA # 02314436]

→ WF-04 @ 10:00 (0-2')

200' S of rail road N of site

200' W of fence along rock creek

1-8oz clear glass, metals &amp; succs

[EPA # 02314437, JOLW5-BNA  
MJOMD6 - Total metals]

→ WF-07 @ 10:15 (0-2')

300' S RR track, 200' W of fence

along Rock Cr. road (N end of digger)

1-8oz clear glass, metals &amp; succs

[EPA # 02314438, JOLW7-BNA  
MJOMD8 - Total metals]

→ WF-06 @ 10:20 (0-2')

18' W of NS spur track PC

300' S of N RR track

[EPA # 02314439, JOLW6-BNA  
MJOMD7 - total metals]

1-8oz glass clear metals &amp; succs

"Rite in the Rain"  
ALL-WEATHER WRITING PAPER



Name B. Pratt / 442m Hill

Address \_\_\_\_\_

Phone \_\_\_\_\_

Project \_\_\_\_\_

Clear Vinyl Protective Slipcovers (Item No. 30) are available for this style of notebook.  
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| p 4-7   | Geoprobe Nest Facility WF-8-75<br>WF-1-8 in previous book | 8/1/02 |
| p 8-13  | RESidence Samples<br>RES 4A,B, 2AB, 5A,B,<br>Surface Soil | 8/1/02 |
| p 14-19 | Cell Sampling Geoprobe<br>CS-2A, -2B, -3                  | 8/2/02 |

6

80° light breeze, sunny

8/1/02

B. Pratt

→ WF-12U @ 11:30 (O-6")

18' N of S. end of dryer, 33' W of fence along Rock Cr road.

1- 8oz clear jar - swoc's &amp; metals

1- 8oz amber jar - dioxin &amp; furan

[EPA # 02314446; JOL56 - BNA  
MJOMAO - Total metals]

→ WF-12L @ 11:30 (O-2')

same location as 12U

1- 8oz clear glass jar - swoc's &amp; metals

1- 8oz amber glass jar - dioxin &amp; furan

[EPA # 02314481; JOL51 - BNA  
MJOMA1 - Total metals]

→ WF-13 @ 11:48 (O-1')

21' W of fence along Rock Cr Rd, 40' N of

[EPA # 02314482; JOL52 - BNA  
MJOMAZ - Total metals]PFD = < 1 down hole, O-BZ  
only top 1' was collected

7

8/1/02 B. Pratt

→ WF-14 @ 12:05 (O-2')

12' W of Fence along Rock Cr Rd

37' S of retort conc pad

PFD = O BZ, 0 down hole

[EPA # 02314483; JOL53 - BNA  
MJOMA3 - Total metals]

4' N of 4' conc vault

1- 8oz clear glass swoc's &amp; metals

→ WF-15 @ 12:30 (O-2')

130' S of sedge retort conc pad

PFD = O BZ, 0 down hole

50' ~~W~~ W of fence along Rock Cr Rd[EPA # 02314484; JOLR4 - BNA  
MJOMA4 - Total metals]

1- 8oz clear glass swoc's &amp; metals

8/2/02

B. Pratt

→ RES-~~04~~ A 02-A @ 14:45  
 1523 W. Main (Farrow) <sup>Front</sup> yard

- 1- 4oz clear glass LL PAH
- 1- 8oz clear glass metab SVOCs

[EPA # 02314475; JOL P9-BNA]  
 MJOM 91 - Total metals

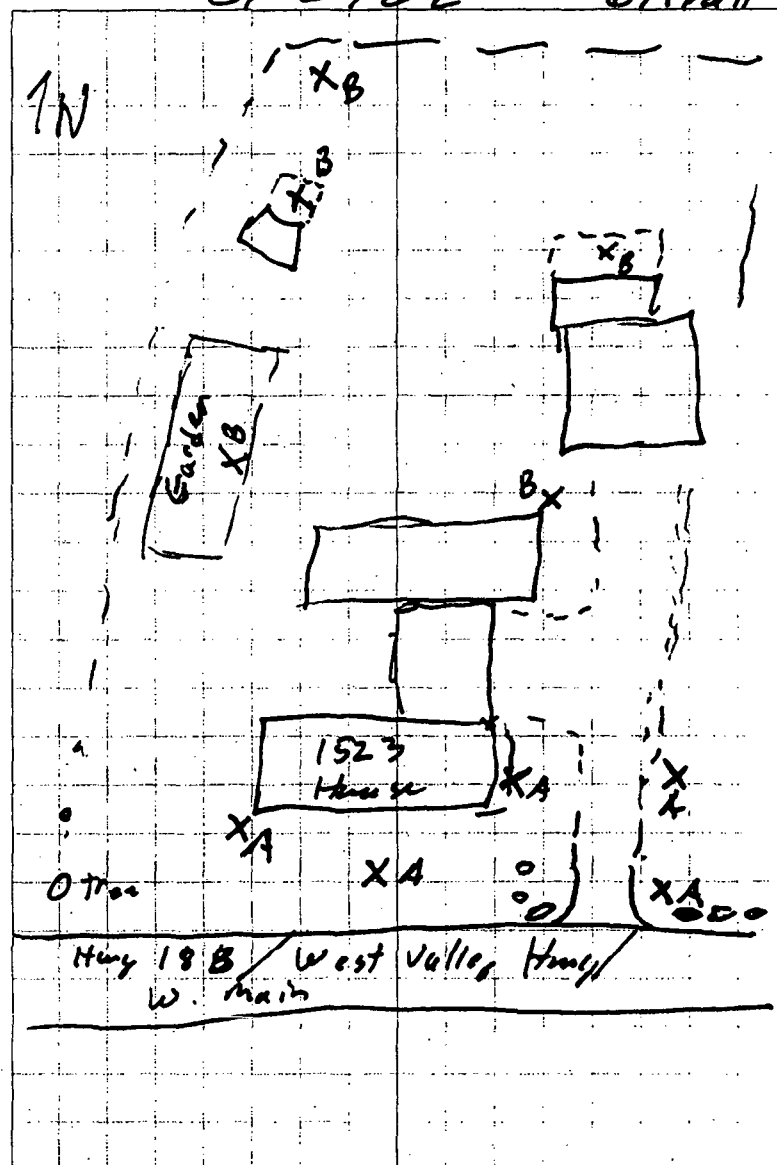
→ RES-02 B @ 15:15  
 Back yard

- 1- 4oz clear glass jar LL PAHs
- 1- 8oz clear glass jar SVOCs & metals
- 1- 8oz amber glass jar dioxins & furans

[EPA # 02314476; JOL Q0-BNA]  
 MJOM 92 - Total metals

8/2/02

B. Pratt



8/2/02 H. P. Miller

CS-2A

→ ~~Cell-02A~~ @ 9:15~~1 - 8oz jar amber glass - dioxin~~

1 - 8oz jar clear glass - metals &amp; SVOCs

1 - Tall 8oz jar clear glass - (metals) TCLP

1 - tall - 8oz jar clear glass - (SVOC) TCLP

See map for location

[EPA # 02314485; DOLR7-BNA  
MJOMAT - total metals]

CS-DUP

→ ~~Cell-DUP~~ @ 10:00 (actual = 9:15)

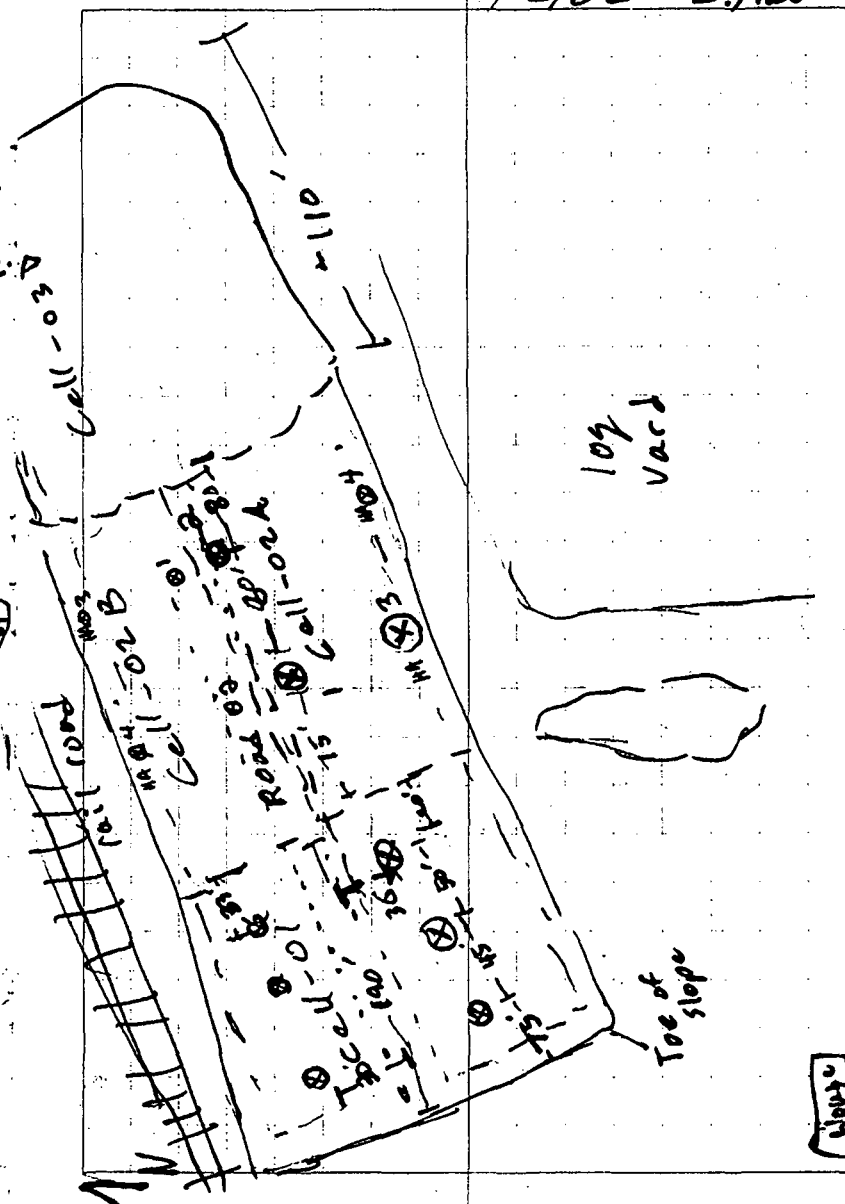
Same location as Cell-02A

1 - 8oz tall clear glass - TCLP - metals

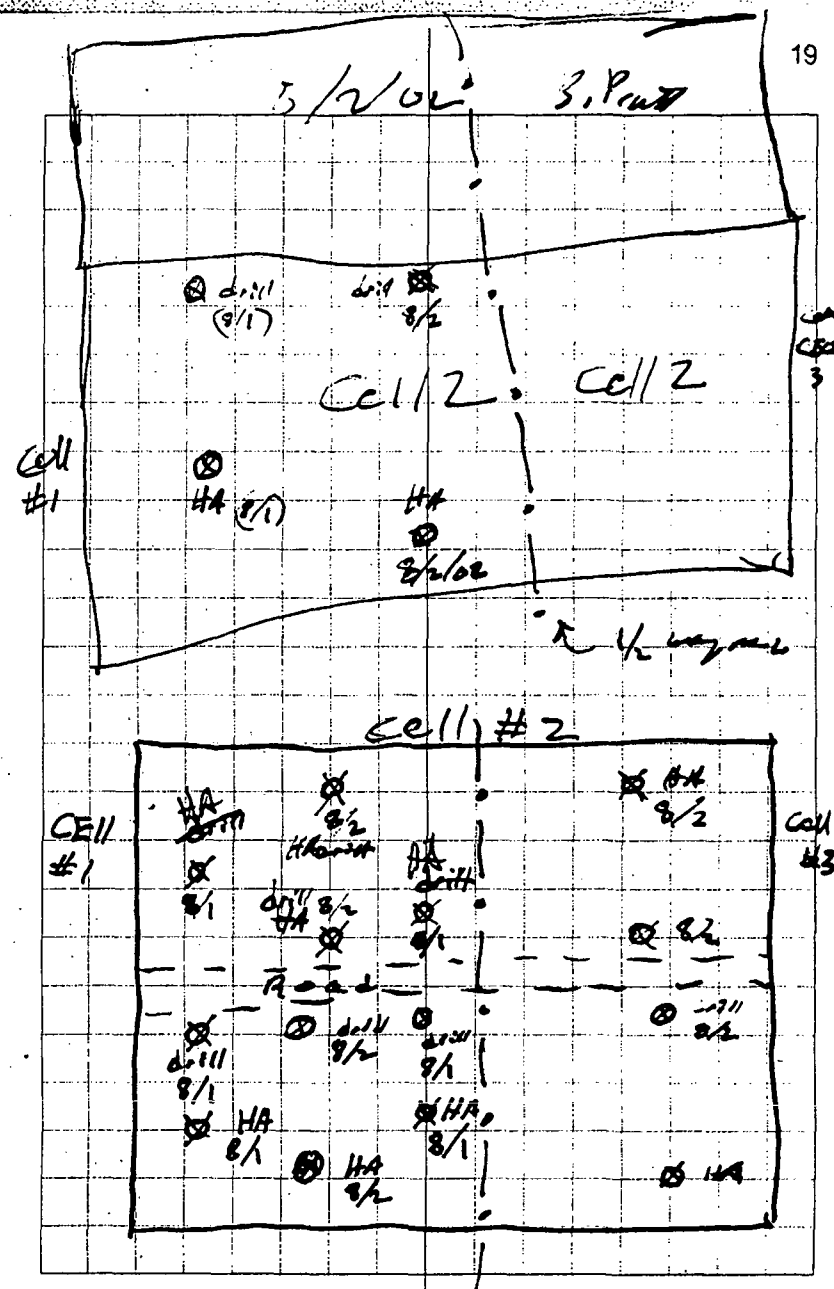
1 - 8oz Tall clear glass - TCLP - SVOCs

[EPA # 02314487]

8/2/02 B. Pratt







"*Rite in the Rain*"<sup>®</sup>  
ALL-WEATHER WRITING PAPER



## FIELD

All-Weather Notebook  
No. 351

|                          |
|--------------------------|
| M. Niemet                |
| Taylor Lumber Phase 2 FI |
|                          |
|                          |

4 5/8" x 7" - 48 Numbered Pages

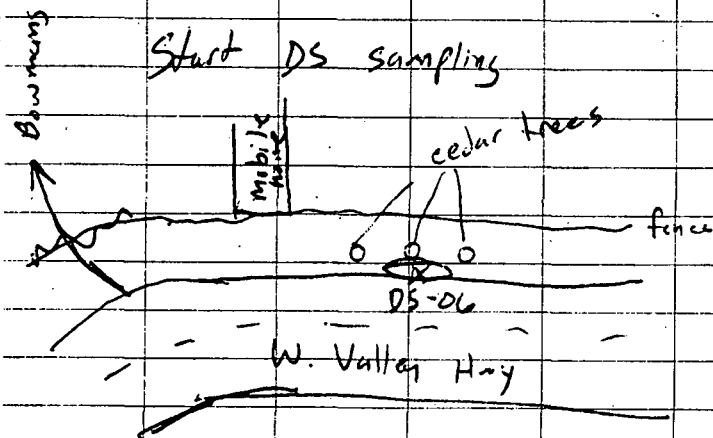
7/30/02 - Tuesday

7:45 am - Arrive @ site

Geotech completing MW-21S

9:00 am - Start installation of  
MW 22S

1:30 pm - Start installation @ MW-18S  
photo # 4



3:10 pm - Sample DS-06

- ① SVOCs + Metals
- ② Dioxins

7/31/02 - Wednesday

7:30 am - Arrive @ site

Sunny ~60°F expected high ~80°F

8/2/02 - Friday

7:30 am - Arrive @ site

Sunny ~60°F expected high ~80°F

8:45 am - Arrive @ loc. of  
BKG-01 about 100 yds  
north of T.S. on west  
side of RCR. Across  
from former TLT office  
EPA # 02314434

9:00 am - Take Sample BKG-02  
1/4 mi. west of RCR.

Behind Fallen log posted  
"private property"

EPA # 02314436

11:45 Take RS-07 (LLPAH, SVOCs + Met)

From channel 50 yards  
downstream of culvert  
(0-2" of water)

EPA # 02314495

CLP # JOLXZ, MJOMB3

13:30 Take RS-08 (LLPAH, SVOCs + Met)

About 75 feet downstream of  
RR bridge

EPA # 02314496

CLP # JOLX9, MJOMB0

13:40 Take RS-09 (LLPAH, SVOCs + Met)  
Upstream of RR bridge

EPA # 02314497

CLP # JOLY0, MJOMBI

13:45 - Take BKG-03 (As)

Just ~~west~~ west of oak tree  
on the ~~NE~~ SW side of  
RR trestle

~~BBP~~ + MS/MSD

EPA # 02314480

- Take Field dup. BKG-DUP

EPA # 02314497

14:00 - Take BKG-04 (As)

North of RR bridge

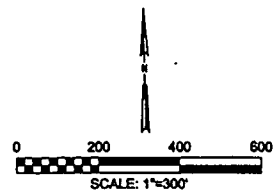
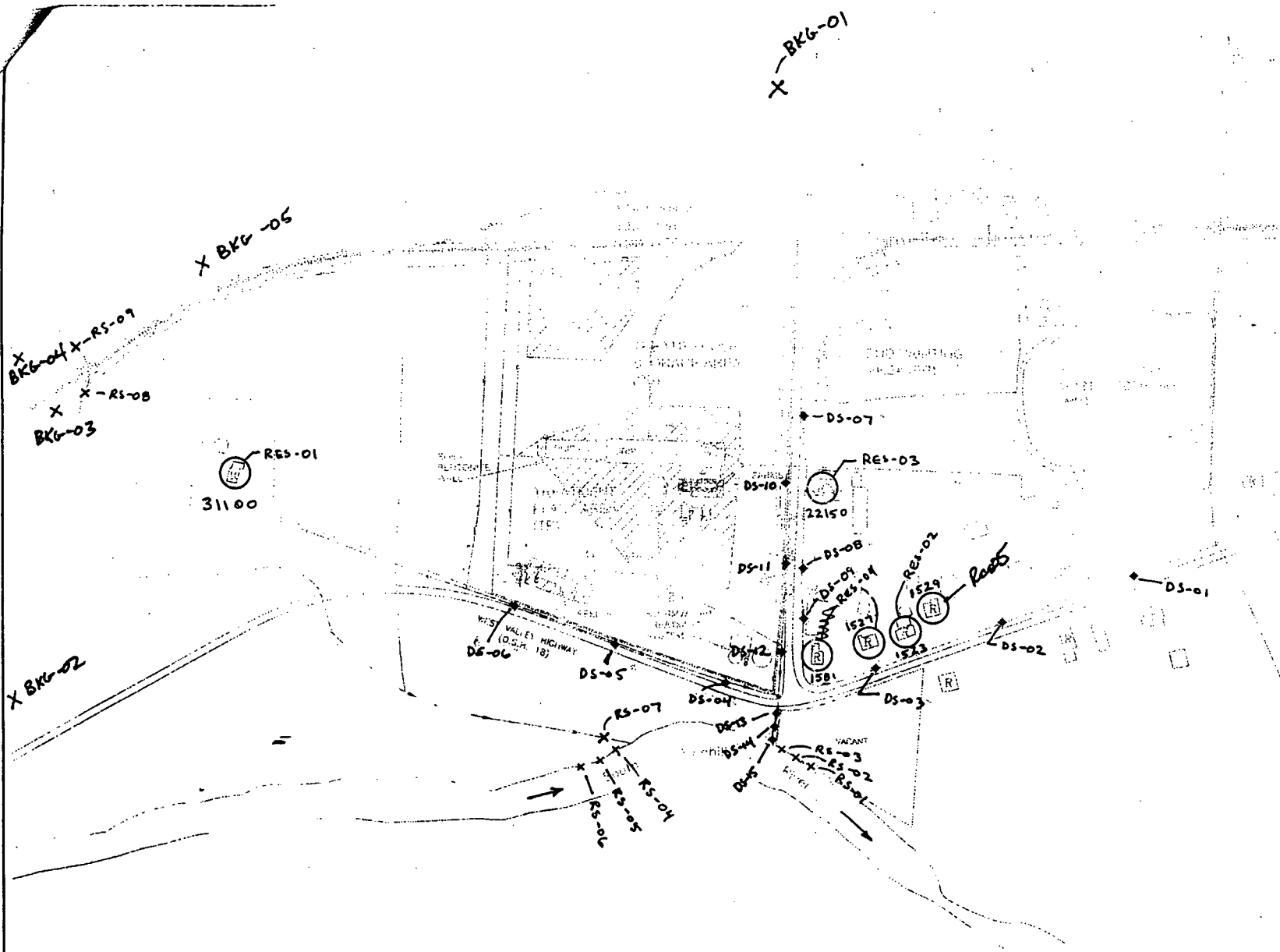
On the other side (north)  
of field to NW of bridge

EPA # 02314498

14:20 - Take BKG-05 (As)

In ~~field~~ field about 100 yards  
east of RR bridge

EPA # 2314499



- LEGEND**
- TAYLOR LUMBER & TREATING FACILITY PROPERTY LINE
  - [R] RESIDENTIAL HOUSE
  - STORM WATER FLOW DIRECTION
  - > CULVERT
  - ▨ ASPHALT CAP
  - X RIVER SEDIMENT SAMPLING LOCATION
  - ◆ DITCH SOIL SAMPLING LOCATION
  - RESIDENTIAL SOIL SAMPLING LOCATION

**FIGURE 2**  
**DITCH SOIL, RESIDENTIAL SOIL,**  
**AND RIVER SEDIMENT**  
**SAMPLE LOCATIONS**  
 PHASE 2 FIELD INVESTIGATION  
 TAYLOR LUMBER AND TREATING SITE  
 SHERIDAN, OREGON

"*Rite in the Rain*"  
ALL-WEATHER WRITING PAPER



## FIELD

All-Weather Notebook  
No. 351

|  |
|--|
| <i>Groundwater Sampling</i>                        |
| <i>Geoprobe Temp wells</i>                         |
| <i>8/1/02</i>                                      |
| <i>Taylor Lumber - Phase 2 Field Investigation</i> |

4 5/8" x 7" - 46 Numbered Pages

*Rob Healy*

Location 2 → GP-02 47  
 water level = 4.61  
 purged ~ 1 gallon  
 Sampled at 8:45  
 well abandoned with chips.

JOL Q3

Location 3 → GP-03 -GW 49  
 water level = 3.6 JOLQ5  
 purged 2 ~~gpm~~ gallons  
 Sampled at 9:05

Equipment blank ~~855~~

GP-ELB-GW 855 48 JOLQ4

GP-DVP-GW 9:15 50 JOLQ6

Location 4 → GP-09 51  
 water level = 3.56 JOLQ7  
 Amt Purged = 2 gal  
 Sampled at = 9:30

Location 5 → GP-08 52  
 water level = 1.24 JOLQ8  
 Amt Purged = 2  
 Sampled at = 10:00

MS/MSD

9 sample  
 bottles

Location 6 → GP-07 53  
 water level = NM JOLQ9  
 Amt purged = 0.25 venting @ 10:30  
 Sampled at 12:35

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ALL-WEATHER WRITING PAPER



## FIELD

All-Weather Notebook

No. 351

|                    |
|--------------------|
| <i>Taylor Lums</i> |
| <i>7/31/02</i>     |
|                    |
| <i>Robert Shau</i> |

4 5/8" x 7" - 48 Numbered Pages



|       |       |       |         |       |         |       |
|-------|-------|-------|---------|-------|---------|-------|
| June  | EF-09 | EF-09 | -60     | (CLP) | metals  | BNA   |
|       |       |       |         |       | MSJOMBS | JOL57 |
|       |       |       | 10 * 61 | -     | MSJOMB9 | JOL58 |
|       |       |       | 11      | 62    | MSJOMC0 | JOL59 |
|       |       |       | 12      | 63    | MSJOMC1 | JOL60 |
| 14:45 | 08    |       | 65      |       | MSJOMC3 | JOLT2 |
| 15:15 | * 06  |       | 66      |       | MSJOMC4 | JOLT3 |
| 15:30 | 05    |       | 67      |       | MSJOMC5 | JOLT4 |
| 15:00 | 07    |       | 68      |       | MSJOMC0 | JOLT9 |
| 16:10 | 03    |       | 69      |       | MSJOMC9 | JOLT8 |
| 16:40 | 02    |       | 70      |       | MSJOMC8 | JOLT7 |
| 17:00 | 01 *  |       | 71      |       | MSJOMC7 | JOLT6 |
| 16:20 | 04    |       | 72      |       | MSJOMC5 | JOLT5 |

## Foot Facility

purple Samples 0-6"

09-12 Sampled 11-12 PM

Flagged / staked  
behind M.M.

09 - hard soil under lay

10-12 Soil/Gravel in wetland  
area.

08 Landpacked gravel

07 grass near bldg - granular soil

06 in ditch soft dark soil

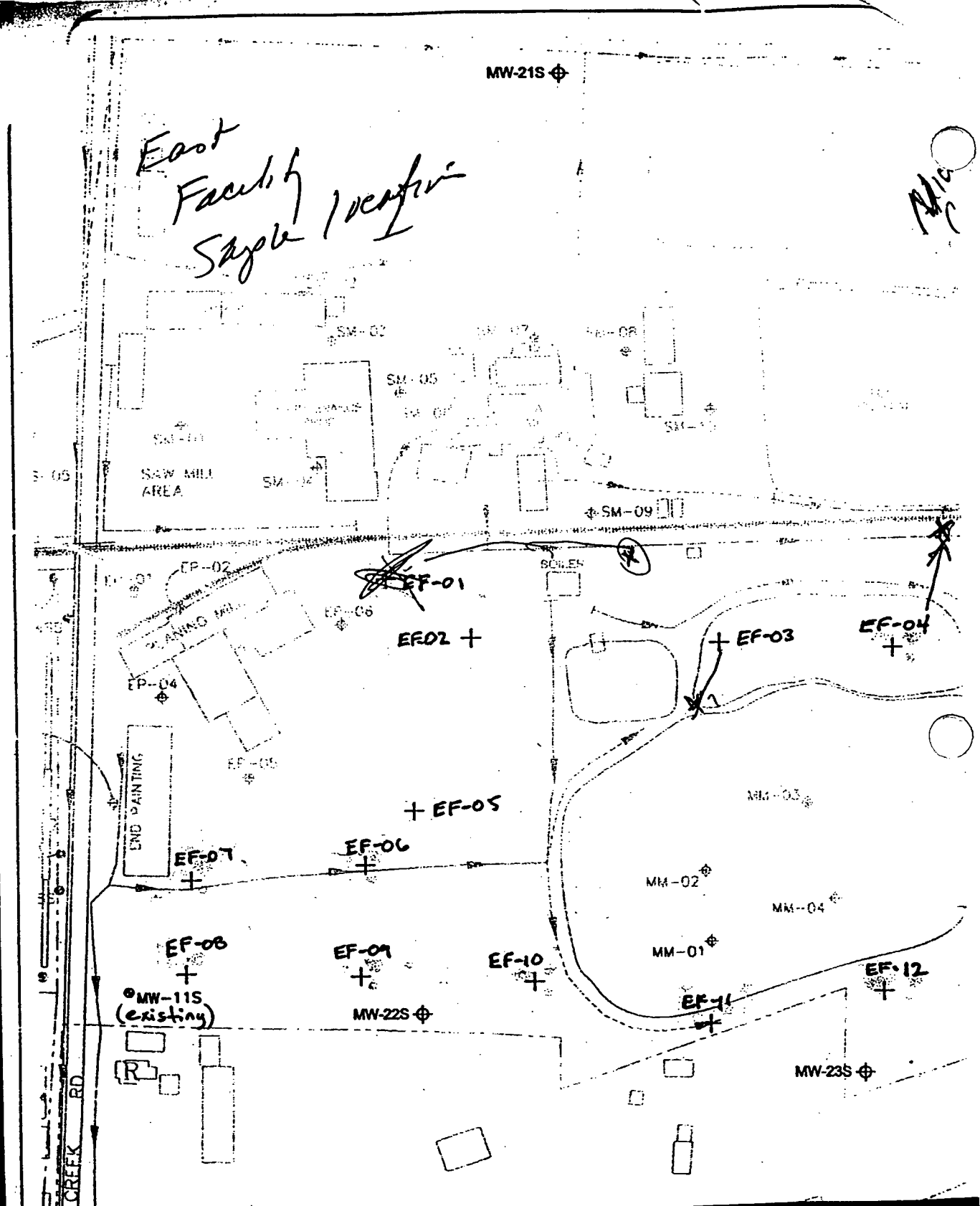
05 ungravel behind pad dry dirt

03 undraining ditch between  
old log pad & M.M.  
surface dried sediment-re gravel04 - clearing's alt over gravel  
< 1 inch

MW-21S

East  
Facility  
Sample 100000

10/10



# 5/1 Soil Storage Cells

Soil fence - Knock over or cut?

cell 1 6 cm, across  
should be fine

cell 2 break into two parts  
→ 2 samples

will need to land auger  
outside most of it

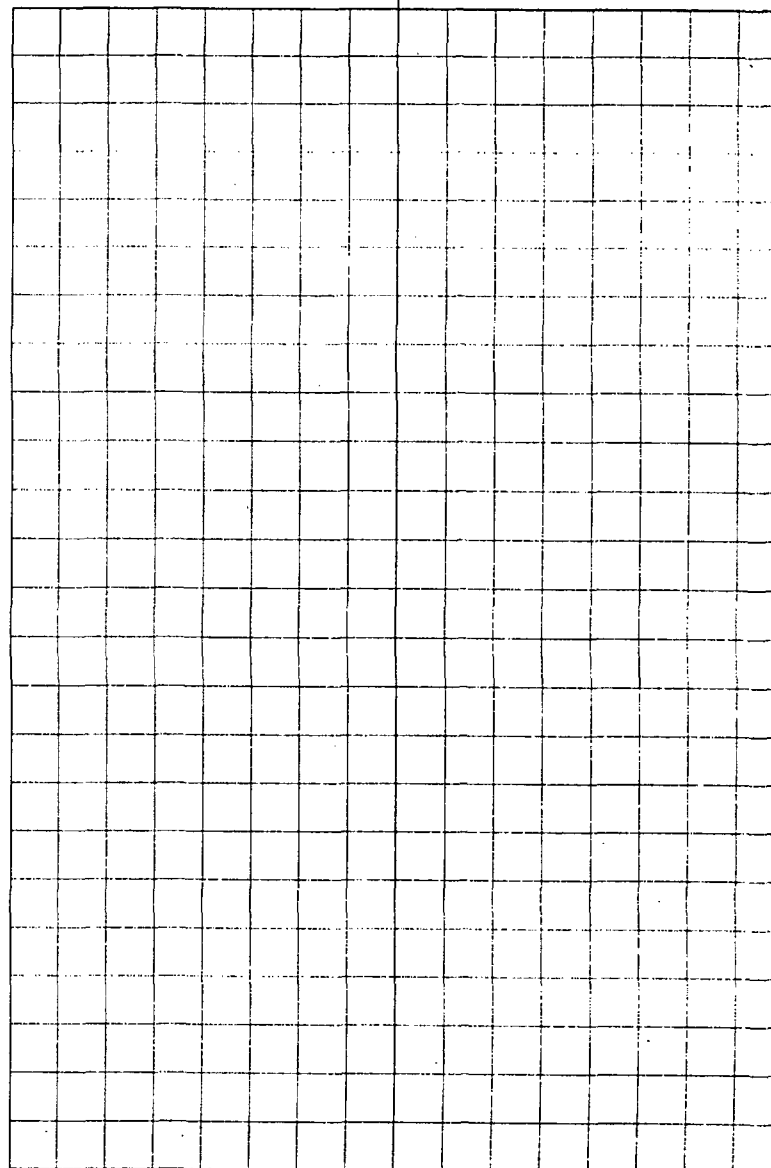
cell 3 Land auger except  
for south access point?

need to get moisture content  
TCLP, TOXIC

TCLP + FD → March  
SWC2/soils not done  
descriptions 1x

5 samples

| ID    | EPA | meals                           | BNA   | time |
|-------|-----|---------------------------------|-------|------|
| CS-1  | 79  | <del>MEPA</del><br>70<br>MJOADI | JBLUD |      |
| CS-29 | 80  | MJDMO2                          | JOLWI |      |



| time  | Source   | Vol.<br>bunch      | EPA #        | Sample Type       |
|-------|----------|--------------------|--------------|-------------------|
| 13:30 | MW 175   | 2.5                | 02314<br>504 | total SVOCs/metal |
| 13:45 | MW 205   | 2                  | 505          | " 1500 "          |
| 14:40 | geoprobe | 1/2                | 506          | " " "             |
| 14:45 | 185      | 2                  | 503          | TCLP 2000         |
| 14:30 | 235      | 1/2 + 3/4          | 500          | TCLP "            |
| 14:40 | 225      | 1 full             | 501          | TCLP              |
| 14:45 | 215      | 2 bunch<br>130 gal | 502          | TCLP              |
|       | 195      | 2 bunch            | 507          | San. total        |

note subs are listed  
do they contain conc  
of photo subs are not listed

CLP #

BNA

metal

JULY 3

MSJOME 2

JULY 1

MSJOME 1

JULY 4

MSJOME 3

JULY 5

MSJOME 5

Site Daily  
Diary/Health  
and Safety  
Log

Taylor Lumber  
165241.AN.D1  
7/29/02  
Bruce Pratt



**CH2MHILL**

Date: 7/29/02 Project #: 165241 <sup>AN-01</sup> By: B. Pratt

| Time | Comments   |
|------|--|
| 9:30 | PID Calibration  |
|      | CH2M Hill C-101279   |
|      | minirac 2000   |
|      | Fresh air first point<br>used ambient O <sub>2</sub> ppm<br>obtained.                        |
|      | Used 100 ppm<br>Isobutylene lot #<br>TC 39M NRC 17/22<br>M1003, 101 ppm<br>obtained          |
| 9:45 | CGI Calibration  |
|      | MSA watchman multigas<br>monitor: CH2M Hill C-101288   |
|      | Calibrated Calibration chart<br>w/ Total safety 50% LEL<br>0.75% pentane, 15% O <sub>2</sub> |
|      | lot # TC 39M NRC 17/22<br>M1003, lot # 63675<br>Reading, 15.2% O <sub>2</sub> , 49% LEL      |

Date: 7/30/02 Project #: 165241 AN-81 By: B. Pratt

Conditions

Calibration Data: CGE = CH<sub>2</sub>M Hill # C-10/200

MSA Watch man, Used cal gas by  
total safety bot # 63675, 50 LEL, 15% O<sub>2</sub>  
42% LEL obtained, 15.7% O<sub>2</sub>  
obtained.

PID = CH<sub>2</sub>M Hill # 100784, mini mae 200

used pha isobutylene - 100 ppm cal gas.

100 ppm obtained, fresh air = 0 detected.

Site Personnel: \_\_\_\_\_ on \_\_\_\_\_ off \_\_\_\_\_

B. Pratt

R. Herby

M. Niemet

Site Visitors: \_\_\_\_\_ on \_\_\_\_\_ off \_\_\_\_\_

Decontamination: \_\_\_\_\_

Date: \_\_\_\_\_ Project #: \_\_\_\_\_ By: \_\_\_\_\_

Well/Boring No.: MW-225 Level: \_\_\_\_\_

| Time          | Depth | Breathing Zone     |                     |          | Down Hole          |          | Comments |
|---------------|-------|--------------------|---------------------|----------|--------------------|----------|----------|
|               |       | HNU/<br>OVA<br>PPM | %<br>O <sub>2</sub> | %<br>LEL | HNU/<br>OVA<br>PPM | %<br>LEL |          |
| 9:00          | 0     | 0                  | 21                  | 0        |                    |          |          |
| 9:15          | 5     | 0                  | 20.7                | 0        | 0                  | 0        |          |
| 9:30          | 10    | 0.4                | 20.8                | 0        | 2.6                | 0        |          |
| 9:45          | 15    | 0                  | 20.8                | 0        |                    |          |          |
| <u>MW-185</u> |       |                    |                     |          |                    |          |          |
| 13:35         | 0     | 0                  | -                   | 0        |                    |          |          |
| 13:40         | 5     | 0                  |                     |          |                    |          |          |
| 13:50         | 10    | 0                  | 20.3                | 0        |                    |          |          |
| 14:15         | 15    | 0                  | 20.3                | 0        | 0                  | 0        |          |
| <u>MW-205</u> |       |                    |                     |          |                    |          |          |
| 15:50         | 0     | 0                  | 20.6                | 0        |                    |          |          |
| 16:00         | 5     | 0                  | 20.6                | 0        |                    |          |          |
| 16:15         | 12    | 0                  | 20.6                | 0        |                    |          |          |



Decontamination: \_\_\_\_\_

Well/Boring No.: MW-19s Level: \_\_\_\_\_

[illegible]

Calibration Data: \_\_\_\_\_

Site Personnel: \_\_\_\_\_ on \_\_\_\_\_ off \_\_\_\_\_

Site Visitors: \_\_\_\_\_ on \_\_\_\_\_ off \_\_\_\_\_

Decontamination: \_\_\_\_\_

Date: 7/31/02 Project #: \_\_\_\_\_ By: Niemet

Well/Boring No.: MW-1015 Level: \_\_\_\_\_  
(over-drill)

| Time   | Depth | Breathing Zone     |                     |          | Down Hole          |          | Comments |
|--|-------|--------------------|---------------------|----------|--------------------|----------|----------|
|  |       | HNU/<br>OVA<br>PPM | %<br>O <sub>2</sub> | %<br>LEL | HNU/<br>OVA<br>PPM | %<br>LEL |          |
| 3:45   | 0     | 0                  | 20.7                | 0        |                    |          |          |
| 4:00   | 5     | 0                  | 20.7                | 0        | 0                  | 0        |          |
| 4:15   | 15    | 0                  | 20.7                | 0        | 0                  | 0        |          |
| <p>The smell of creosote was readily apparent however it did not register on the P.I.D</p> |       |                    |                     |          |                    |          |          |

Attachment B-4  
MW-101S Well Replacement

## MW-101S Well Replacement

TO: Robin Strauss  
Loren McPhillips

COPIES: Randy Pratt  
Scott McKinley

FROM: Michael Niemet

DATE: August 8, 2002

The trace of DNAPL observed inside the barrier wall in February and May of 2002 does not account for the significant DNAPL reported during the IA. At that time, all of the monitoring wells at the Taylor Lumber Site were constructed of polyvinylchloride (PVC). However this may be problematic for the wells within the barrier wall since PVC and creosote are known to be chemically incompatible. The creosote is likely to degrade the PVC over time, and it is possible that the 0.010-inch machine slots in the PVC well screen have been compromised at locations where extended contact with creosote has occurred.

To investigate this issue, MW-101S was replaced with a 4-inch stainless steel screen and casing during the Phase 2 Field Investigation. MW-101S was chosen due to its location near the center of the believed location of the NAPL plume. Also, during the original installation of MW-101S, visible DNAPL was observed within a 6-foot interval above the siltstone.

The well replacement took place on July 31<sup>st</sup>, 2002, and the proceeded as follows:

- The concrete around vault was broken up
- The auger was used to break up the steel vault
- A chain was attached to the concrete seal around the well casing and the entire well screen and casing were pulled from the ground intact
- The hole was overdrilled using an 8 1/4-inch hollow stem auger, resulting in a 12-inch borehole, to 22.5 feet
- The stainless steel well was installed

The following observations were made during the installation process:

- When the well was pulled from the ground, small streams of water were spraying from only a few locations in the well screen.
- A shimmering coat of NAPL covered the well screen
- The well screen and casing were stained, with the stain grading from light to dark with depth.

- When the auger reached a depth of about 15 feet, the drill cuttings emerging at the surface became a smooth, gray, oily paste, smelling strongly of creosote, and remained like this throughout the remainder of the boring.
- As the auger was removed, each flight was heavily caked with this paste, and had to be laboriously scraped clean. The entire last 5-foot-section of auger to be removed was dripping heavily with dark brown oil that appeared to be creosote

The bottom 5 feet of well were cut into three pieces and brought back to the office for inspection. The following observations were noted:

- The PVC seemed to have been softened somewhat, however, no signs physical deformation were apparent
- The sump section of the well was not as stained, probably because it resided in bentonite backfill (Photos 1 and 2)
- The staining on the inside of the well was much lighter than the outside (Photos 3 and 4)
- The slots were filled with a dark gray deposit. Complete obstruction of the slots was typical of the slots nearest the bottom of the screen. The upper slots were partially obstructed with the deposits (Photo 5)
- At the time of inspection the deposits were a dry crust. It is possible that when the well was in place the deposits existed as more of a sludge.
- The slots could be readily pried open with a knife.

In conclusion, it appears that as expected extensive DNAPL exists at MW-101S, and that the NAPL was prevented from entering the well as a result of physical restriction of the screen slots. However, the restriction did not appear to be related to deformation of the PVC, but due to blockage by dark deposits within the slots. Based on these findings it is unclear whether the new stainless steel well will allow the NAPL to enter freely, or if it too may become fouled with the same deposits. Fortunately, the effective wall thickness is much less for the vee-wire stainless steel screen vs. the Schedule 40 PVC screen and therefore has less surface area for the deposits to potentially become entrapped.



Photo 1. The bottom "sump" section of the well, including the last 3 or 4 slots.



Photo 2. The two pieces from the lower 4 feet of the well screen. The darker piece (top in photo) was the deeper section.

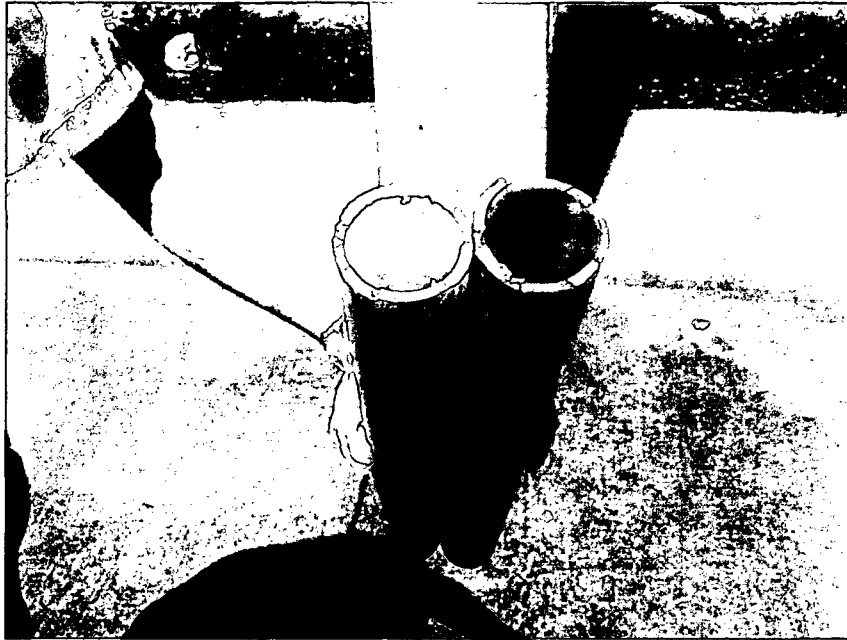


Photo 3. A look inside the screen sections shows that the staining is much less pronounced on the inside.



Photo 4. The alignment of the three pieces showing the color gradation from light to dark with depth.

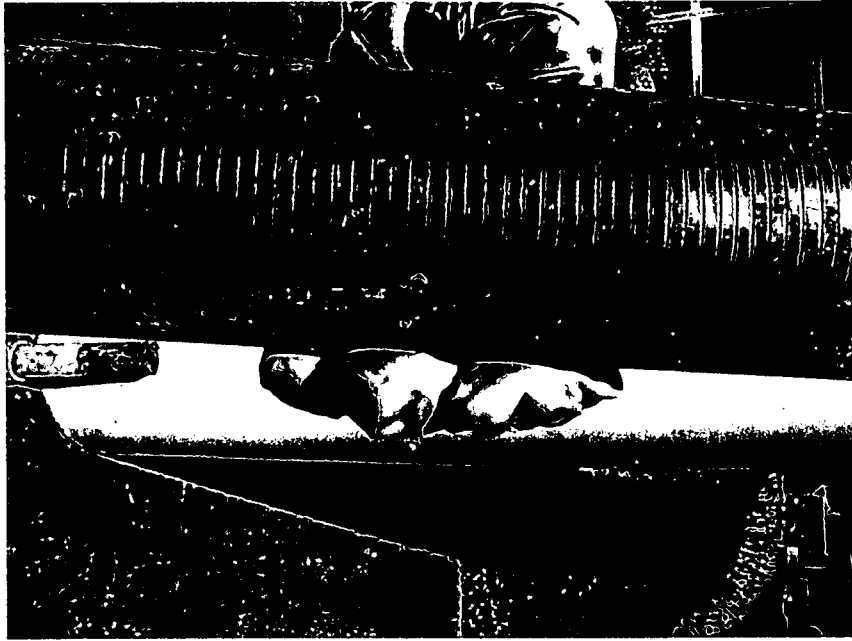


Photo 5. A close-up showing the dark deposits in the screen slots.



Attachment B-5  
Supplemental Sampling Events to the  
Phase 2 Field Investigation

## Supplemental Sampling Events to the Phase 2 Field Investigation

TO: Robin Strauss  
FROM: Michael Niemet  
DATE: July 8, 2003

This memorandum describes the purpose and procedure of the two supplemental sampling events to the Phase 2 Field Investigation. The Phase 2 Field Investigation took place during July-August 2002. The supplemental sampling activities involved soil and river/creek sediment and were conducted on November 22, 2002 and February 20, 2003. A summary of the samples obtained in these supplemental events is provided in Table 1. For maps of the sample locations and a discussion of the analytical results refer to the Phase 2 Remedial Investigation.

**TABLE B5-1**  
Sample Summary  
*Supplemental Sampling Events to the Phase 2 Field Investigation*

| Sample ID   | Date     | Media                | Analytes                   |
|-------------|----------|----------------------|----------------------------|
| DS-02       | 11/22/02 | Ditch Soil           | Dioxins/Furans             |
| DS-11       | 11/22/02 | Ditch Soil           | Dioxins/Furans             |
| DS-16       | 11/22/02 | Ditch Soil           | Dioxins/Furans             |
| DS-17       | 11/22/02 | Ditch Soil           | Dioxins/Furans             |
| DS-18       | 11/22/02 | Ditch Soil           | Dioxins/Furans             |
| DS-19       | 11/22/02 | Ditch Soil           | Dioxins/Furans             |
| DS-20       | 2/20/03  | Ditch Soil           | Dioxins/Furans, As, Cu, Cr |
| DS-21       | 2/20/03  | Ditch Soil           | Dioxins/Furans, As, Cu, Cr |
| DS-22       | 2/20/03  | Ditch Soil           | Dioxins/Furans, As, Cu, Cr |
| DS-23       | 2/20/03  | Ditch Soil           | Dioxins/Furans, As, Cu, Cr |
| RS-10       | 11/22/02 | River/Creek Sediment | Dioxins/Furans             |
| RS-11       | 2/20/03  | River/Creek Sediment | Dioxins/Furans, As, Cu, Cr |
| RES-03D,E,F | 11/22/02 | Residential Soil     | Dioxins/Furans             |

## **November 22, 2002**

A total of 10 samples were obtained: 7 grab samples from ditches and Rock Creek and 3 composite samples from a residence on Rock Creek Road (Figure B5-1). Samples were collected with new stainless steel spoons from a depth of 0-2 inches and homogenized in a new plastic dish before being placed in 8-oz glass sample jars. New spoons and mixing dishes were used for each sample. All samples were analyzed for dioxins/furans only. The purpose of obtaining the additional samples was to better delineate the extent of dioxin/furan contamination in areas where elevated dioxins/furans were observed in the data from July-August.

Ditch soil samples DS-16 and DS-17 were collected from the ditch between the southern boundary of the West Facility and the northern side of the West Valley Highway (Hwy 18B). Sediment sample RS-10 was collected from between gravel and rock on the shoreline of Rock Creek approximately 80 feet downstream of the Hwy 18B culvert. Residential soil samples RES-03D, E, and F were composited from locations in the front, side and back yards (respectively) of the residence at 22150 SW Rock Creek Road. Ditch soil sample DS-19 was taken from the ditch adjacent to the front yard (on the east side of Rock Creek Road). Ditch soil samples DS-11 and DS-18 were taken in the ditch between the east side of the West Facility and the west side of Rock Creek Road. Ditch soil sample DS-02 was taken at a location sampled in August that was not analyzed for dioxins/furans, in the ditch on the north side of Hwy 18B, east of the intersection of Rock Creek Road and Hwy 18B.

Copies of the field notes for the November 22, 2002 sampling event are attached to this memorandum.

## **February 20, 2003**

A total of 5 grab samples were from ditches and Rock Creek. Samples were collected with new stainless steel spoons from a depth of 0-2 inches and homogenized in a new plastic dish before being placed in 8-oz glass sample jars. New spoons and mixing dishes were used for each sample. All samples were analyzed for dioxins/furans and As, Cu, Cr. The purpose of obtaining the additional samples was to better delineate the extent of dioxin/furan contamination emanating from the White Pole Storage area.

Ditch soil sample DS-20 was collected just below the outfall of the culvert beneath Hwy 18B. Ditch soil samples DS-21, 22, and 23 were collected from the southern boundary of the White Pole Storage area. Sediment sample RS-11 was collected from Rock Creek, just downstream of the confluence with the drainage ditch from the White Pole Storage area.

Copies of the field notes for the February 20, 2003 sampling event are attached to this memorandum.

"*Rite in the Rain*"  
ALL-WEATHER WRITING PAPER



## FIELD

All-Weather Notebook  
No. 351

|                          |
|--------------------------|
| Taylor Lumber            |
| Dioxin Sampling 11/22/02 |
| Mike Niemet              |
| Justin Iverson           |

4 5/8" x 7" - 48 Numbered Pages



Project \_\_\_\_\_

[illegible]

Conditions:

~ 48°F

Cloudy

foggy

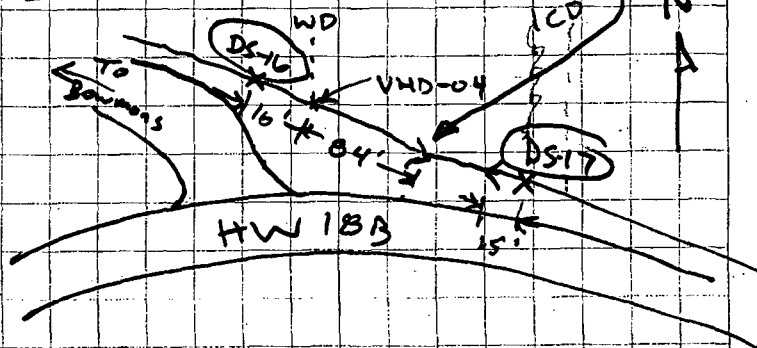
damp

DS-16

12:10

106

~~82~~ feet west of culvert



- Note: There is no drainage from WD across HW IBD all drainage goes through culvert

DS-17

12:20

15 feet east of culvert

- noted slight sheen on water near sample point

Photo 1: Justin @ DS-17

2: outfall from CD

→ Drainage from outfall  
goes through culvert  
to RC.

3: Culvert

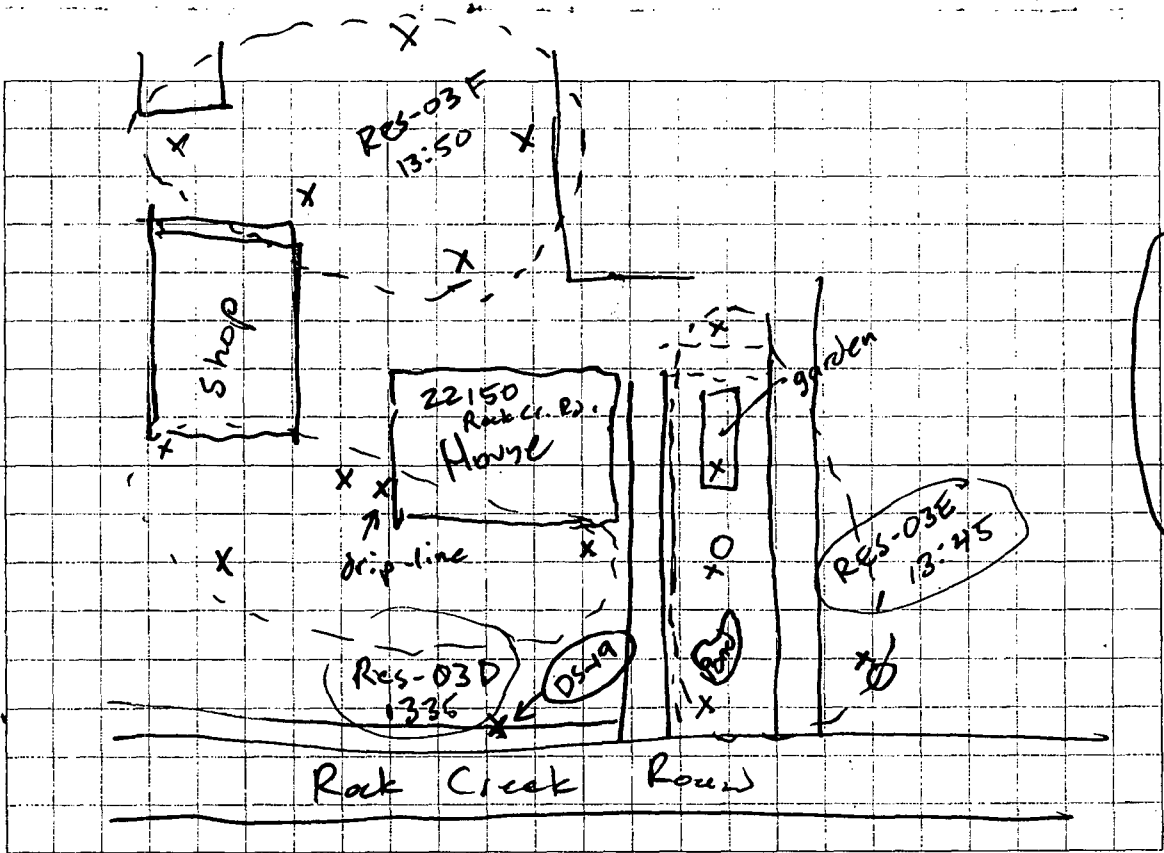
4: Looking west @ location  
of DS-16

RS-10      12:30

30' below culvert

Taken from the shoreline  
from between gravel & Rock

Photo 5: Justin @ RS-10



Res - 03



DS-19

13:55

See prev. map.

DS-11

14:10

@ stake marker  
~ 230' S of culvert

— Lots of rip-rap

Photo 6: Justin @ DS-11

Photo 7: Looking S. down  
RCD @ TLT entrance

Photo 8: Looking W.  
@ DS-12

Photo 9: Looking NW @ ditch  
— Many small trees and  
shrubs

DS-18

14:30

← @ approx. loc.  
of RCD-07

Easy sample - not much rip-rap

Photo 10: Looking N @ DS-18

DS-02

14:45

Sampled @ marked location

Photo 11: Looking W @ DS-02

Photo 12: Mini burrito, looking NW

Photo 13: Big burrito, Cell #5, looking N

Photo 14: Big burrito, Cells #2 &amp; 3, looking NE

Photo 15: Looking N along dryer

Photo 16: Looking N, standing @ N end of dryer

Photo 17: Looking W over wetland S of Mac's MH

## 2-20-03 Taylor Lumber Soil/sediment sampling

B. Colborn, A. Chang

1x4 oz jar 1x8 oz jar  
All samples collected for Dioxins/Furans + As, Cu, Cr.

1240- Follow cleared path to final confluence of drainage ditch & Rock Creek. Path marked with orange flagging.

1255- trail was cleared during heavy rain on 2-18-03 while flow was high, there is currently no visible flow along course of drainage ditch.

1310 - Collect sediment sample at RS-11, location marked with orange flagging. Soil is sand with silt, med. brown, sand fine to med., moist to wet, loose, some organics - roots, leaves -

1325- locate DS-20 down cleared trail ~20 yards from outflow at culvert, mark with orange flagging.

1345- Collect DS-20, soil is <sup>sandy silt</sup> ~~silt~~ ~~and~~ med. brown sand fine to <sup>coarse</sup> ~~med.~~, loose, wet, very high in organics - roots, leaves, location marked w/ orange flagging. Very low flow thru ditch.

1400 locate DS21 at W. end of white pole cut-off pad. collect sample from final 8 feet of drainage before it exits beneath fence. Location marked w/ orange flagging on fence.

1415 - Collect DS-21, collect duplicate sample, Dup #3,  
(time), soil is silt w/ sand, ~~red~~ brown, sand is  
fine to coarse, wet, loose, high organics. Location  
is 187' W. of culvert under West Valley Hwy.

1425 - locate DS-22 247' W. of culvert as noted  
above, mark w/ orange flagging. Sample collected  
in final 8' of drainage before exiting under  
fence.

1440 - Collect DS-22, soil same as above.

1445 - locate DS-23 325' W. of culvert as noted  
above, mark w/ orange flagging

1455 Collect DS-23, soil as above.

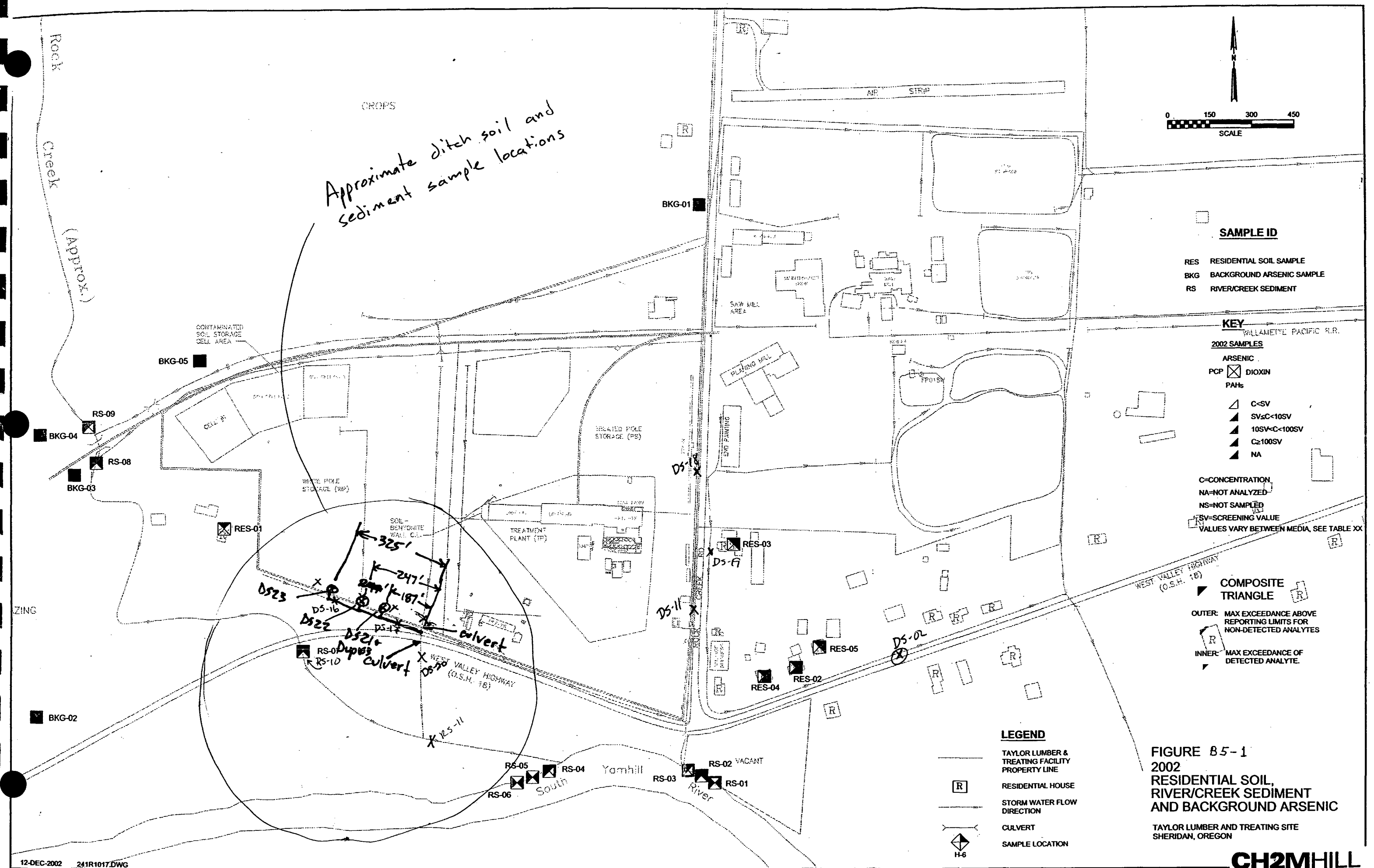


FIGURE B5-1  
2002  
RESIDENTIAL SOIL,  
RIVER/CREEK SEDIMENT  
AND BACKGROUND ARSENIC

TAYLOR LUMBER AND TREATING SITE  
SHERIDAN, OREGON

Attachment B-6  
Fate of Investigation Derived Waste  
from 2002 Field Investigation

## Fate of Investigation Derived Waste from 2002 Field Investigation

TO: Robin Strauss  
FROM: Michael Niemet  
DATE: July 8, 2003

This memorandum describes the fate of the investigation derived waste (IDW) generated as a result of the field investigation conducted at the Taylor Lumber and Treating (TLT) site during July-August 2002. A total of twenty-seven 55-gallon drums of IDW were generated as a result of the field investigation. The drums were stored onsite pending the results of laboratory analysis to determine disposal options.

The IDW consisted primarily of drill cuttings from monitor well installations. Other media consisted of soil from geoprobe samples, debris from the removal/installation of MW-101S, and water used for decontamination (decon). One sample was collected from the drill cuttings of each of the seven new monitor wells (MW-17S, 18S, 19S, 20S, 21S, 22S, and 23S) and the geoprobe soil. An inventory of the drum contents is shown in Table 1.

**TABLE 1**  
IDW Drum Inventory  
*TLT Phase 2 Field Investigation*

| Drum Contents       | No.       |
|---------------------|-----------|
| MW-17S              | 3         |
| MW-18S              | 2         |
| MW-19S              | 2         |
| MW-20S              | 2         |
| MW-21S              | 3         |
| MW-22S              | 1         |
| MW-23S              | 2         |
| MW-101S             | 4         |
| MW-101S (debris)    | 1         |
| MW-101S (sludge)    | 1         |
| Geoprobes           | 1         |
| Decon Water (Wells) | 3         |
| Decon Water (Geo)   | 2         |
| <b>Total:</b>       | <b>27</b> |

### New Monitor Wells

The barrels labeled MW-17S, MW-19S, and MW-20S, contained cuttings from wells installed in the West Facility. Samples were analyzed for SVOCs and metals. No exceedances of Industrial PRGs or non-wastewater UTSs were observed. Based upon the contained in rule, soils in these barrels were used as fill material within the boundaries of the Pacific Wood Preserving facility. The data from these analyses can be found in the Phase 2 Data Evaluation Report, and the Phase 2 Remedial Investigation.

Cuttings in the barrels labeled MW-18S, MW-21S, MW-22S, and MW-23S, were tested by TCLP to determine if they met the toxicity characteristic. These barrels contained cuttings from wells located in areas with no history of spills, drips, or other impacts from wood preservatives. No compounds were detected above the regulatory limits and these soils are not considered a hazardous waste. Therefore, the soils in these barrels were used as clean fill material.

### **Decon Water**

The five drums of decon water were disposed of in the facility evaporators.

### **MW-101S Soil, Sludge, and Debris and Geoprobe Soil**

The soil, sludge, and debris from the removal/installation of MW-101S were obviously contaminated with creosote and would require treatment and disposal as a hazardous waste. Additionally, the soil from the geoprobe installation contained arsenic at 15 mg/kg, which was slightly above that which could be considered as background.

On June 13<sup>th</sup>, 2003, Waste Watch, LLC picked up these materials for transport to a cement kiln in Hannibal, Missouri for incineration and disposal at a cost of \$350 per drum. Prior to transport, the drums labeled MW-101S (debris) and (sludge) were combined, reducing the number of drums requiring transport from seven to six. A copy of the manifest is attached to this memorandum.





# DEPARTMENT OF NATURAL RESOURCES

DIVISION OF ENVIRONMENTAL QUALITY  
Hazardous Waste Program

P.O. Box 176 Jefferson City, Missouri 65102  
573-751-3176

## HAZARDOUS WASTE MANIFEST

THIS DOCUMENT MUST BE USED FOR ALL MISSOURI-DESTINED SHIPMENTS.  
INSTRUCTIONS FOR THE COMPLETION OF THIS FORM ARE ON A SEPARATE SHEET.

|                       |                                    |                            |   |
|-----------------------|------------------------------------|----------------------------|---|
| EMERGENCY<br>RESPONSE | U.S. COAST GUARD<br>1-800-424-8602 | CHEMTREC<br>1-800-424-9300 | DEPT. OF NATURAL<br>RESOURCES<br>573-634-2436 |
|-----------------------|------------------------------------|----------------------------|---|

Print or type (Form designed for use on elite (12-pitch) typewriter)

Form Approved OMB No. 2050-0039

|   |  |  |  |   |  |                                 |
|---|--|--|--|---|--|---------------------------------|
| <b>UNIFORM HAZARDOUS<br/>WASTE MANIFEST</b>   |  | 1. Generator's US EPA ID No.<br><b>0000000014400</b> | Manifest<br>Document No.<br><b>0000000014400</b> | 2. Page<br>1 of 1   | Information in the shaded areas<br>is required by State law. |                                 |
| 3. Generator's Name and Mailing Address<br><b>US2WA Superfund, Taylor Lumber<br/>ECL-15, 1200 6th Ave<br/>Seattle, WA 98101-3129</b>  |  |  |  | A. Missouri Manifest Document Number<br><b>032403</b>   |  |                                 |
| 4. Generator's Phone ( )  |  |  |  | B. G.S.F. (Generator Address)   |  |                                 |
| 5. Transporter 1 Company Name<br><b>WasteWatch, L.L.C.</b>  |  |  |  | C. MO Trans ID  |  |                                 |
| 6. US EPA ID Number<br><b>0000000014400</b>   |  |  |  | D. Transporter's Phone  |  |                                 |
| 7. Transporter 2 Company Name<br><b>Savannah Transport, Inc.</b>  |  |  |  | E. MO Trans ID  |  |                                 |
| 8. US EPA ID Number<br><b>0000000014400</b>   |  |  |  | F. Transporter's Phone  |  |                                 |
| 9. Designated Facility Name and Site Address<br><b>Continental Cement Co, LLC<br/>10107 Highway 79<br/>Hannibal, MO 65401-0011</b>  |  |  |  | G. State Facility ID<br><b>10107</b>  |  |                                 |
| 10. US EPA ID Number<br><b>0000000014400</b>  |  |  |  | H. Facility Phone   |  |                                 |
| 11. US DOT Description (Including Proper Shipping Name, Hazard Class, ID Number and Packing Group (if any))<br><b>HQ, Waste Environmentally hazardous substances, solid,<br/>n.p.s., (hexamethylenetetramine), 9, UN2077, PG1</b> |  |  |  | 12. Containers<br>Number<br><b>6</b>  | 13. Total<br>Quantity<br><b>4200</b>                         | 14. Unit<br>Wt/Vol<br><b>lb</b> |
| 15. Special Handling Instructions and Additional Information<br><b>a) EPA 171 Emergency Phone No. 503-504-1793</b>  |  |  |  | 16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations and applicable state regulations.<br>If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment. OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method available to me that I can afford. |  |                                 |
| 17. Transporter 1 Acknowledgement of Receipt of Materials<br>Printed/Typed Name: <b>Michael N. ...</b><br>Signature: <b>[Signature]</b><br>Date: <b>06/13/03</b>  |  |  |  | 18. Transporter 2 Acknowledgement of Receipt of Materials<br>Printed/Typed Name: <b>Jim Gibbens</b><br>Signature: <b>[Signature]</b><br>Date: <b>06/13/03</b>   |  |                                 |
| 19. Discrepancy Indication Space  |  |  |  | 20. Designated Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in item 19.<br>Printed/Typed Name: <b>[Signature]</b><br>Signature: <b>[Signature]</b><br>Date: <b>06/13/03</b>   |  |                                 |

GENERATOR COPY - PART 6  
IMPORTANT  
SEE INSTRUCTIONS SHOULD PART 1 & 2 FAIL TO RETURN  
WITHIN 35 DAYS

Appendix C  
Groundwater Monitoring

# Groundwater Monitoring

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This appendix contains descriptions of groundwater monitoring activities and includes field parameter and water level results. Monitor well construction diagrams and geologic logs are included in Appendix B. Analytical data for groundwater are presented in Appendix A. Sampling procedures are described in detail in the *Groundwater Monitoring Field Sampling Plan* (January 2002). Refer to figures in the Report for sample locations.

## Groundwater Monitoring Activities

### Water Level Monitoring

Water levels were measured in all onsite monitor wells and piezometers each month. Depth to water to the nearest 0.01-foot from the top of casing was measured with an electric water level indicator, which was decontaminated between wells. Water levels were measured prior to sampling during the quarterly groundwater sampling events. Water level data are presented in Table C-1. Groundwater contour maps prepared from the February and November 2002 and May 2003 water level data are presented in Figures C-1, C-2, and C-3. During this monitoring, wells were inspected for damage and the extraction wells were checked to confirm they were operational. Any problems with the extraction well/pump system were brought to the attention of Pacific Wood Preserving of Oregon (PWP).

During the September 2002 event, it was noted that oil had been spilled into MW-14S. Upon making inquiries, it was determined that PWP spilled cutting oil on and around the vault cover while working on some equipment. In October, an absorbent sock was placed in the well, straddling the oil-water interface, to collect as much oil as possible. The sock was replaced monthly until April 2003, when no oil was observed in the sock and drainage from the sock had no visible hydrocarbon sheen. After this incident, the well has been used for water level monitoring but not for groundwater sampling. The above ground portion of MW-4S was badly bent, presumably by a vehicle, prior to the February 2003 sampling event and can no longer be monitored.

### Quarterly Groundwater Sampling

During each quarterly monitoring event, groundwater samples were collected from the onsite wells outside the barrier wall, two monitor wells inside the wall, the extraction wells, and wells at two adjacent residences. During the August 2002 quarterly monitoring event, groundwater samples were also collected from all wells inside the barrier wall to assist in quantifying the extent of dense non-aqueous-phase liquid (DNAPL) beneath the Treatment Plant area.

During the first quarter sampling event, an oil-water interface probe was used to detect the presence of non-aqueous-phase liquid (NAPL) in all wells inside the barrier wall, and wells outside the wall in proximity to it. Traces of DNAPL were observed in only two wells (N1-D and N-2D) in February. As a result, only wells inside the barrier wall were checked for

DNAPL during subsequent events. In May 2002, traces of DNAPL were observed in N1-D and MW-101s; no DNAPL was observed in September 2002. In 2003, traces of DNAPL were observed in N1-D in February and May, and in N2-D in May. A hydrocarbon sheen was observed on the water surface of MW-101S in September and October 2002, and in April 2003. DNAPL observations are presented in Table C-2.

To produce groundwater samples that are representative of geochemical conditions in the aquifer surrounding each well, a minimum of three well casings were purged prior to sampling. Well purging and sampling was conducted with dedicated Teflon tubing and a peristaltic pump. Pumping rates were generally less than 0.5 gallons per minute (gpm).

Field parameter measurements (temperature, pH, dissolved oxygen, oxidation-reduction potential, specific conductivity, and turbidity) were collected once per well casing volume during purging. Groundwater samples were collected after field parameter readings stabilized to within 10 percent of the previous measurement, and turbidity readings were less than 5 to 15 nephelometric turbidity units (NTUs). Final pre-sampling field parameters for the first six quarterly sampling events are presented in Table C-3. Low-flow sample methods were used and the samples were not filtered.

When a low-yielding well was encountered (such as MW-10S), one well casing volume was bailed and the well allowed to recover to within 80 percent of the original static water level before sampling. If a well was known to be low-yielding, field parameters were collected during the start and end of the one well casing volume removal effort.

## **Well Development**

Monitor wells installed in late July (MW-17 through MW-23, and MW-101s) were developed between August 23 and 29 to remove turbidity created by the drilling and construction process. The development process was documented on well development forms, included at the end of this appendix (Attachment C1).

The wells were developed by means of mechanical surging and over-pumping using a peristaltic pump. The polyethylene tubing used for pumping was fitted with two to three surge blocks slightly smaller than the inside diameter of the well, and the entire apparatus (surge blocks and pump intake) was rapidly raised and lowered to create a surging action in the well to allow for pumping from all levels of the screened interval. Development continued until the turbidity of the water stabilized at a satisfactory level.

**TABLE C**  
Monthly Water Level Measurements  
Taylor Lumber and Treating Superfund Site

|             |                |                    |                         |                             |                  |                          |                           |                     |                        |               |              | 2/11/02       |              |
|-------------|----------------|--------------------|-------------------------|-----------------------------|------------------|--------------------------|---------------------------|---------------------|------------------------|---------------|--------------|---------------|--------------|
| Well Number | Date Installed | Facility Area      | TOC Elevation (ft amsl) | Surface Elevation (ft amsl) | TOC Stickup (ft) | Depth of Casing (ft bgs) | Depth of Casing (ft amsl) | Top Screen (ft bgs) | Bottom Screen (ft bgs) | Geologic Unit | TD (ft btoc) | DTW (ft btoc) | wl (ft amsl) |
| MW-1S       | 01/12/87       | Treated Pole Sto.  | 207.61                  | 207.20                      | 0.41             | 15.00                    | 192.20                    | 9.50                | 14.50                  | Alluvium      | 14.95        | 3.13          | 204.48       |
| MW-2S       | 08/15/96       | Treatment Plant    | 208.48                  | 206.38                      | 2.10             | 17.20                    | 189.18                    | 9.20                | 17.00                  | Alluvium      | 20.15        | 6.36          | 202.12       |
| MW-2D       | 01/15/87       | Treatment Plant    | 208.07                  | 206.30                      | 1.77             | 30.00                    | 176.30                    | 20.00               | 29.00                  | Siltstone     | 31.00        | 5.54          | 202.53       |
| MW-4S       | 01/13/87       | Treatment Plant    | 210.71                  | NA                          | approx 2         | 16.00                    |                           | 11.00               | 16.00                  | Alluvium      | 17.80        | 7.08          | 203.63       |
| MW-4D       | 01/15/87       | Treatment Plant    | 209.60                  | 208.24                      | 1.36             | 29.00                    | 179.24                    | 19.00               | 29.00                  | Siltstone     | 30.35        | 5.72          | 203.88       |
| MW-6S       | 12/06/95       | Treatment Plant    | 204.68                  | NA                          | flush            | 11.90                    |                           | 6.50                | 11.40                  | Alluvium      | 11.40        | 2.35          | 202.33       |
| MW-6D       | 12/06/95       | Treatment Plant    | 204.78                  | NA                          | flush            | 29.20                    |                           | 19.90               | 29.20                  | Siltstone     | 29.50        | 2.35          | 202.43       |
| MW-7S       | 08/16/96       | Truck Shop         | 212.72                  | 210.73                      | 1.99             | 19.50                    | 191.23                    | 13.30               | 18.10                  | Alluvium      | 21.70        | 4.61          | 208.11       |
| MW-7D       | 08/22/96       | Truck Shop         | 213.08                  | 210.90                      | 2.18             | 32.00                    | 178.90                    | 22.10               | 32.00                  | Siltstone     | 33.80        | 5.02          | 208.06       |
| MW-8D       | 02/11/97       | Treatment Plant    | 206.89                  | 207.12                      | -0.23            | 31.40                    | 175.72                    | 21.00               | 31.00                  | Siltstone     | 28.15        | 3.85          | 203.04       |
| MW-9S       | 12/16/96       | South of Hwy 18B   | 205.78                  | 204.45                      | 1.33             | 14.30                    | 190.15                    | 6.30                | 13.30                  | Alluvium      | 15.65        | 8.90          | 196.88       |
| MW-10S      | 12/16/96       | South of Hwy 18B   | 203.17                  | 201.97                      | 1.20             | 10.50                    | 191.47                    | 4.50                | 9.50                   | Alluvium      | 11.35        | 9.53          | 193.64       |
| MW-11S      | 12/16/96       | East of R.C. Rd.   | 207.27                  | 205.61                      | 1.66             | 17.50                    | 188.11                    | 6.50                | 16.50                  | Alluvium      | 19.14        | 2.75          | 204.52       |
| MW-12S      | 01/14/00       | Treatment Plant    | 204.49                  | 204.80                      | -0.31            | 12.00                    | 192.80                    | 7.00                | 12.00                  | Alluvium      | 11.57        | 2.33          | 202.16       |
| MW-13S      | 01/12/00       | Treatment Plant    | 204.92                  | 205.28                      | -0.36            | 14.00                    | 191.28                    | 9.00                | 14.00                  | Alluvium      | 13.90        | 3.20          | 201.72       |
| MW-14S      | 01/12/00       | Treatment Plant    | 205.82                  | 206.13                      | -0.31            | 14.50                    | 191.63                    | 9.50                | 14.50                  | Alluvium      | 15.15        | 8.49          | 197.33       |
| MW-15S      | 01/13/00       | Treatment Plant    | 204.65                  | 205.14                      | -0.49            | 12.50                    | 192.64                    | 7.50                | 12.50                  | Alluvium      | 12.56        | 2.57          | 202.08       |
| MW-16S      | 01/13/00       | Treatment Plant    | 205.19                  | 205.62                      | -0.43            | 13.50                    | 192.12                    | 8.50                | 13.50                  | Alluvium      | 13.41        | 2.73          | 202.46       |
| MW-17S      | 07/31/02       | Treatment Plant    | 209.24                  | 209.54                      | -0.30            | 19.00                    | 190.54                    | 8.50                | 18.50                  | Alluvium      |              |               |              |
| MW-18S      | 07/31/02       | Below Soil Storage | 211.41                  | 209.12                      | 2.29             | 15.50                    | 193.62                    | 5.00                | 15.00                  | Alluvium      |              |               |              |
| MW-19S      | 07/31/02       | Treatment Plant    | 210.44                  | 208.22                      | 2.22             | 15.50                    | 192.72                    | 5.00                | 15.00                  | Alluvium      |              |               |              |
| MW-20S      | 07/30/02       | Treatment Plant    | 208.87                  | 206.36                      | 2.51             | 14.50                    | 191.86                    | 4.00                | 14.00                  | Alluvium      |              |               |              |
| MW-21S      | 07/30/02       | East of R.C. Rd.   | 214.97                  | 212.58                      | 2.39             | 25.50                    | 187.08                    | 15.00               | 25.00                  | Alluvium      |              |               |              |
| MW-22S      | 07/30/02       | East of R.C. Rd.   | 205.55                  | 203.02                      | 2.53             | 15.00                    | 188.02                    | 4.50                | 14.50                  | Alluvium      |              |               |              |
| MW-23S      | 07/29/02       | East of R.C. Rd.   | 203.86                  | 201.53                      | 2.33             | 15.50                    | 186.03                    | 5.00                | 15.00                  | Alluvium      |              |               |              |
| MW-101S     | 05/11/00       | Treatment Plant    | 206.81                  | 207.10                      | -0.29            | 18.50                    | 188.60                    | 8.00                | 18.00                  | Alluvium      | 18.20        | 4.43          | 202.38       |
| MW-101S     | 07/30/02       | Treatment Plant    | 206.98                  | 207.23                      | -0.25            | 18.00                    | 189.23                    | 8.00                | 18.00                  | Alluvium      |              |               |              |
| MW-102S     | 05/10/00       | Treatment Plant    | 207.49                  | 207.80                      | -0.31            | 16.50                    | 191.30                    | 11.00               | 16.00                  | Alluvium      | 16.80        | 4.86          | 202.63       |
| MW-103S     | 05/10/00       | Treatment Plant    | 207.62                  | 207.80                      | -0.18            | 16.00                    | 191.80                    | 10.50               | 15.50                  | Alluvium      | 15.90        | 3.50          | 204.12       |
| MW-104S     | 05/10/00       | Treatment Plant    | 205.22                  | 205.40                      | -0.18            | 14.00                    | 191.40                    | 8.50                | 13.50                  | Alluvium      | 13.77        | 4.13          | 201.09       |
| N-1S        | 12/17/96       | Treatment Plant    | 209.89                  | 208.24                      | 1.65             | 10.80                    | 197.44                    | 4.80                | 9.80                   | Alluvium      | 12.55        | 6.33          | 203.56       |
| N-1D        | 12/17/96       | Treatment Plant    | 209.90                  | 208.24                      | 1.66             | 17.40                    | 190.84                    | 11.40               | 16.40                  | Alluvium      | 19.20        | 6.43          | 203.47       |
| N-2S        | 12/18/96       | Treatment Plant    | 207.27                  | 207.49                      | -0.22            | 10.20                    | 197.29                    | 4.00                | 9.00                   | Alluvium      | 9.45         | 3.60          | 203.67       |
| N-2D        | 12/17/96       | Treatment Plant    | 207.03                  | 207.38                      | -0.35            | 16.60                    | 190.78                    | 11.00               | 16.00                  | Alluvium      | 16.15        | 3.21          | 203.82       |
| N-3S        | 12/20/96       | Treatment Plant    | 207.83                  | 208.24                      | -0.41            | 9.00                     | 199.24                    | 3.80                | 7.20                   | Alluvium      | 8.85         | 4.24          | 203.59       |
| N-3D        | 12/23/96       | Treatment Plant    | 207.74                  | 208.08                      | -0.34            | 18.20                    | 189.88                    | 10.00               | 17.00                  | Alluvium      | 17.90        | 3.16          | 204.58       |
| PZ-101      | 08/12/96       | Treatment Plant    | 208.48                  | 206.80                      | 1.68             | 13.50                    | 193.30                    | 7.00                | 13.00                  | Alluvium      | 14.73        | 3.57          | 204.91       |
| PZ-102      | 08/09/96       | Treatment Plant    | 204.02                  | 204.93                      | -0.91            | 12.20                    | 192.73                    | 9.00                | 12.00                  | Alluvium      | 13.35        | 3.70          | 200.32       |
| PZ-105      | 08/09/96       | Treatment Plant    | 205.94                  | 202.94                      | 3.00             | 12.00                    | 190.94                    | 7.70                | 11.70                  | Alluvium      | 13.50        | 3.67          | 202.27       |
| PZ-116      | 08/12/96       | Treated Pole Sto.  | 211.98                  | 210.37                      | 1.61             | 21.00                    | 189.37                    | 9.50                | 19.50                  | Alluvium      | 20.95        | 4.87          | 207.11       |
| PW-1        | 10/26/01       | Treatment Plant    | 203.9                   | 205.51                      | -1.58            | 11.5                     | 194.01                    |                     |                        | Alluvium      |              |               |              |
| PW-2        | 10/26/01       | Treatment Plant    | 205.0                   | 206.47                      | -1.51            | 12.8                     | 193.72                    |                     |                        | Alluvium      |              |               |              |
| PW-3        | 10/26/01       | Treatment Plant    | 206.3                   | 207.94                      | -1.65            | 16.5                     | 191.44                    |                     |                        | Alluvium      |              |               |              |
| PW-4        | 10/26/01       | Treatment Plant    | 206.979                 | 208.54                      | -1.56            | 17.75                    | 190.79                    |                     |                        | Alluvium      |              |               |              |

Notes:

All depths from top of casing

NA = not available



TABLE C-1

Monthly Water Level Measurements

Taylor Lumber and Treating Superfund Site

|             | 03/13/02         |                 | 04/19/02         |                 | 05/20/02         |                 | 06/20/02         |                 | 07/10/02         |                 | 08/20/02         |                 | 09/18/02         |                 | 10/15/02         |                 |
|-------------|------------------|-----------------|------------------|-----------------|------------------|-----------------|------------------|-----------------|------------------|-----------------|------------------|-----------------|------------------|-----------------|------------------|-----------------|
| Well Number | DTW (ft<br>btoc) | wl (ft<br>amsl) | DTW (ft<br>btoc) | wl (ft<br>amsl) | DTW (ft<br>btoc) | wl (ft<br>amsl) | DTW (ft<br>btoc) | wl (ft<br>amsl) | DTW (ft<br>btoc) | wl (ft<br>amsl) | DTW (ft<br>btoc) | wl (ft<br>amsl) | DTW (ft<br>btoc) | wl (ft<br>amsl) | DTW (ft<br>btoc) | wl (ft<br>amsl) |
| MW-1S       | 2.81             | 204.80          | 3.33             | 204.28          | 3.70             | 203.91          | 3.84             | 203.77          | 3.98             | 203.63          | 4.86             | 202.75          | 5.04             | 202.57          | 4.94             | 202.67          |
| MW-2S       | 6.09             | 202.39          | 6.36             | 202.12          | 6.39             | 202.09          | 6.18             | 202.30          | 5.45             | 203.03          | 6.21             | 202.27          | 6.67             | 201.81          | 6.58             | 201.90          |
| MW-2D       | 5.18             | 202.89          | 5.50             | 202.57          | 5.60             | 202.47          | 5.48             | 202.59          | 4.98             | 203.09          | 5.50             | 202.57          | 5.90             | 202.17          | 5.70             | 202.37          |
| MW-4S       | 6.76             | 203.95          | 7.00             | 203.71          | 6.87             | 203.84          | 6.65             | 204.06          | 6.53             | 204.18          | 6.89             | 203.82          | 7.36             | 203.35          | 7.14             | 203.57          |
| MW-4D       | 5.43             | 204.17          | 5.69             | 203.91          | 5.64             | 203.96          | 5.48             | 204.12          | 5.32             | 204.28          | 5.57             | 204.03          | 6.08             | 203.52          | 5.76             | 203.84          |
| MW-6S       | 2.09             | 202.59          | 2.54             | 202.14          | 2.72             | 201.96          | 2.85             | 201.83          | 3.05             | 201.63          | 3.73             | 200.95          | 3.56             | 201.12          | 3.80             | 200.88          |
| MW-6D       | 2.38             | 202.40          | 2.90             | 201.88          | 3.02             | 201.76          | 3.19             | 201.59          | 3.40             | 201.38          | 4.17             | 200.61          | 3.92             | 200.86          | 4.12             | 200.66          |
| MW-7S       | 4.09             | 208.63          | 4.28             | 208.44          | 4.33             | 208.39          | 4.92             | 207.80          | 5.21             | 207.51          | 6.48             | 206.24          | 7.16             | 205.56          | 7.45             | 205.27          |
| MW-7D       | 4.53             | 208.55          | 4.72             | 208.36          | 4.76             | 208.32          | 5.28             | 207.80          | 5.66             | 207.42          | 6.77             | 206.31          | 7.49             | 205.59          | 7.84             | 205.24          |
| MW-8D       |                  |                 | 4.52             | 202.37          | 4.65             | 202.24          | 4.61             | 202.28          | 4.13             | 202.76          | 4.39             | 202.50          | 4.10             | 202.79          | 3.95             | 202.94          |
| MW-9S       | 7.23             | 198.55          | 9.86             | 195.92          | 9.87             | 195.91          | 10.08            | 195.70          | 10.34            | 195.44          | 10.67            | 195.11          | 10.44            | 195.34          | 10.65            | 195.13          |
| MW-10S      | 9.08             | 194.09          | 9.60             | 193.57          | 10.14            | 193.03          | 10.20            | 192.97          | 10.26            | 192.91          | 10.40            | 192.77          | 10.09            | 193.08          | 10.25            | 192.92          |
| MW-11S      | 2.38             | 204.89          | 2.96             | 204.31          | 3.85             | 203.42          | 4.09             | 203.18          | 4.34             | 202.93          | 5.20             | 202.07          | 5.24             | 202.03          | 5.20             | 202.07          |
| MW-12S      | 3.54             | 200.95          | 2.99             | 201.50          | 3.19             | 201.30          | 3.27             | 201.22          | 3.47             | 201.02          | 4.33             | 200.16          | 4.12             | 200.37          | 4.22             | 200.27          |
| MW-13S      | 2.93             | 201.99          | 3.35             | 201.57          | 3.50             | 201.42          | 3.59             | 201.33          | 3.81             | 201.11          | 4.65             | 200.27          | 4.40             | 200.52          | 4.55             | 200.37          |
| MW-14S      | 8.46             | 197.36          | 8.55             | 197.27          | 8.59             | 197.23          | 8.49             | 197.33          | 4.04             | 201.78          | 7.96             | 197.86          | 9.10             | 196.72          | 9.10             | 196.72          |
| MW-15S      | 2.11             | 202.54          | 2.93             | 201.72          | 3.39             | 201.26          | 3.41             | 201.24          | 3.13             | 201.52          | 3.69             | 200.96          | 3.74             | 200.91          | 3.92             | 200.73          |
| MW-16S      | 2.39             | 202.80          | 3.02             | 202.17          | 3.31             | 201.88          | 3.38             | 201.81          | 3.14             | 202.05          | 3.73             | 201.46          | 3.76             | 201.43          | 3.97             | 201.22          |
| MW-17S      |                  |                 |                  |                 |                  |                 |                  |                 |                  |                 | 3.54             | 205.70          | 4.42             | 204.82          | 4.68             | 204.56          |
| MW-18S      |                  |                 |                  |                 |                  |                 |                  |                 |                  |                 | 7.94             | 203.47          | 8.31             | 203.10          | 8.29             | 203.12          |
| MW-19S      |                  |                 |                  |                 |                  |                 |                  |                 |                  |                 | 8.30             | 202.14          | 8.10             | 202.34          | 7.86             | 202.58          |
| MW-20S      |                  |                 |                  |                 |                  |                 |                  |                 |                  |                 | 9.37             | 199.50          | 8.01             | 200.86          | 9.41             | 199.46          |
| MW-21S      |                  |                 |                  |                 |                  |                 |                  |                 |                  |                 | 10.40            | 204.57          | 11.19            | 203.78          | 11.18            | 203.79          |
| MW-22S      |                  |                 |                  |                 |                  |                 |                  |                 |                  |                 | 8.62             | 196.93          | 9.00             | 196.55          | 9.11             | 196.44          |
| MW-23S      |                  |                 |                  |                 |                  |                 |                  |                 |                  |                 | 9.09             | 194.77          | 9.37             | 194.49          | 9.49             | 194.37          |
| MW-101S     | 3.73             | 203.08          | 4.02             | 202.79          | 4.16             | 202.65          | 3.75             | 203.06          | 3.34             | 203.47          |                  |                 |                  |                 |                  |                 |
| MW-101S     |                  |                 |                  |                 |                  |                 |                  |                 |                  |                 | 4.30             | 202.68          | 4.54             | 202.44          | 4.36             | 202.62          |
| MW-102S     | 4.55             | 202.94          | 4.80             | 202.69          | 4.85             | 202.64          | 4.65             | 202.84          | 4.44             | 203.05          | 4.87             | 202.62          | 5.31             | 202.18          | 5.10             | 202.39          |
| MW-103S     | 2.36             | 205.26          | 4.03             | 203.59          | 5.49             | 202.13          | 5.31             | 202.31          | 5.29             | 202.33          | 5.81             | 201.81          | 5.85             | 201.77          | 5.96             | 201.66          |
| MW-104S     | 4.41             | 200.81          | 4.88             | 200.34          | 4.93             | 200.29          | 4.84             | 200.38          | 2.75             | 202.47          | 3.45             | 201.77          | 3.69             | 201.53          | 5.18             | 200.04          |
| N-1S        | 5.98             | 203.91          | 6.35             | 203.54          | 6.31             | 203.58          | 5.95             | 203.94          | 5.81             | 204.08          | 6.29             | 203.60          | 6.56             | 203.33          | 6.61             | 203.28          |
| N-1D        | 6.04             | 203.86          | 6.41             | 203.49          | 6.36             | 203.54          | 6.00             | 203.90          | 5.84             | 204.06          | 6.31             | 203.59          | 6.61             | 203.29          | 6.63             | 203.27          |
| N-2S        | 3.29             | 203.98          | 3.62             | 203.65          | 3.76             | 203.51          | 3.45             | 203.82          | 3.22             | 204.05          | 3.58             | 203.69          | 4.44             | 202.83          | 4.28             | 202.99          |
| N-2D        | 2.91             | 204.12          | 3.24             | 203.79          | 3.27             | 203.76          | 3.02             | 204.01          | 2.82             | 204.21          | 3.29             | 203.74          | 4.02             | 203.01          | 3.88             | 203.15          |
| N-3S        | 4.26             | 203.57          | 4.33             | 203.50          | 4.44             | 203.39          | 4.46             | 203.37          | 4.32             | 203.51          | 4.64             | 203.19          | 5.21             | 202.62          | 5.01             | 202.82          |
| N-3D        | 3.01             | 204.73          | 4.34             | 203.40          | 4.74             | 203.00          | 4.53             | 203.21          | 4.17             | 203.57          | 4.67             | 203.07          | 5.24             | 202.50          | 5.18             | 202.56          |
| PZ-101      | 3.01             | 205.47          | 3.68             | 204.80          | 4.06             | 204.42          | 4.10             | 204.38          | 4.35             | 204.13          | 5.24             | 203.24          | 4.49             | 203.99          | 5.21             | 203.27          |
| PZ-102      | 3.30             | 200.72          | 3.91             | 200.11          | 4.23             | 199.79          | 4.53             | 199.49          | 4.73             | 199.29          | 5.37             | 198.65          | 5.19             | 198.83          | 5.44             | 198.58          |
| PZ-105      | 3.04             | 202.90          | 4.10             | 201.84          | 4.47             | 201.47          | 4.56             | 201.38          | 4.46             | 201.48          | 4.87             | 201.07          | 4.72             | 201.22          | 4.98             | 200.96          |
| PZ-116      | 4.45             | 207.53          | 4.66             | 207.32          | 4.60             | 207.38          | 4.87             | 207.11          | 5.11             | 206.87          | 6.07             | 205.91          | 6.82             | 205.16          | 6.77             | 205.21          |
| PW-1        |                  |                 |                  |                 | 6.90             | 197.03          |                  |                 |                  |                 |                  |                 |                  |                 | 6.75             | 197.18          |
| PW-2        |                  |                 |                  |                 | 8.81             | 196.15          |                  |                 |                  |                 |                  |                 |                  |                 | 8.81             | 196.15          |
| PW-3        |                  |                 |                  |                 |                  |                 |                  |                 |                  |                 |                  |                 |                  |                 | 11.00            | 195.30          |
| PW-4        |                  |                 |                  |                 |                  |                 |                  |                 |                  |                 |                  |                 |                  |                 | 11.75            | 195.23          |

Notes:

All depths fro

NA = not ava

TABLE C

Monthly Water Level Measurements  
Taylor Lumber and Treating Superfund Site

|             | 11/18/02         |                 | 12/19/02         |                 | 01/20/03         |                 | 02/17/03         |                 | 03/20/03         |                 | 04/23/03         |                 | 05/12/03         |                 |
|-------------|------------------|-----------------|------------------|-----------------|------------------|-----------------|------------------|-----------------|------------------|-----------------|------------------|-----------------|------------------|-----------------|
| Well Number | DTW (ft<br>btoc) | wl (ft<br>amsl) | DTW (ft<br>btoc) | wl (ft<br>amsl) | DTW (ft<br>btoc) | wl (ft<br>amsl) | DTW (ft<br>btoc) | wl (ft<br>amsl) | DTW (ft<br>btoc) | wl (ft<br>amsl) | DTW (ft<br>btoc) | wl (ft<br>amsl) | DTW (ft<br>btoc) | wl (ft<br>amsl) |
| MW-1S       | 4.07             | 203.54          | 3.07             | 204.54          | 3.45             | 204.16          | 3.14             | 204.47          | 3.11             | 204.50          | 3.14             | 204.47          | 3.47             | 204.14          |
| MW-2S       | 6.76             | 201.72          | 6.16             | 202.32          | 6.36             | 202.12          | 6.60             | 201.88          | 6.19             | 202.29          | 5.99             | 202.49          | 6.33             | 202.15          |
| MW-2D       | 5.97             | 202.10          | 5.44             | 202.63          | 5.51             | 202.56          | 5.77             | 202.30          | 5.27             | 202.80          | 5.21             | 202.86          | 5.52             | 202.55          |
| MW-4S       | 7.73             | 202.98          | 7.03             | 203.68          | 7.03             | 203.68          |                  |                 |                  |                 |                  |                 |                  |                 |
| MW-4D       | 6.41             | 203.19          | 5.75             | 203.85          | 5.75             | 203.85          | 5.50             | 204.10          | 5.17             | 204.43          | 5.29             | 204.31          | 5.53             | 204.07          |
| MW-6S       | 2.84             | 201.84          | 2.27             | 202.41          | 2.59             | 202.09          | 2.48             | 202.20          | 2.35             | 202.33          | 2.41             | 202.27          | 2.64             | 202.04          |
| MW-6D       | 3.29             | 201.49          | 2.64             | 202.14          | 2.95             | 201.83          | 2.83             | 201.95          | 2.73             | 202.05          | 2.79             | 201.99          | 2.98             | 201.80          |
| MW-7S       | 7.56             | 205.16          | 6.19             | 206.53          | 5.46             | 207.26          | 4.95             | 207.77          | 4.58             | 208.14          | 4.10             | 208.62          | 4.30             | 208.42          |
| MW-7D       | 7.94             | 205.14          | 6.66             | 206.42          | 5.92             | 207.16          | 5.34             | 207.74          | 4.94             | 208.14          | 4.56             | 208.52          | 4.74             | 208.34          |
| MW-8D       | 4.90             | 201.99          | 4.32             | 202.57          | 4.64             | 202.25          |                  |                 |                  |                 |                  |                 | 4.53             | 202.36          |
| MW-9S       | 9.99             | 195.79          | 7.69             | 198.09          | 8.82             | 196.96          | 9.00             | 196.78          | 8.11             | 197.67          | 8.99             | 196.79          | 9.50             | 196.28          |
| MW-10S      | 9.94             | 193.23          | 9.51             | 193.66          | 9.80             | 193.37          | 9.74             | 193.43          | 9.43             | 193.74          | 9.67             | 193.50          | 9.88             | 193.29          |
| MW-11S      | 3.97             | 203.30          | 2.64             | 204.63          | 3.08             | 204.19          | 2.76             | 204.51          | 2.57             | 204.70          | 2.82             | 204.45          | 3.32             | 203.95          |
| MW-12S      | 3.27             | 201.22          | 2.72             | 201.77          | 3.06             | 201.43          | 3.03             | 201.46          | 2.85             | 201.64          | 2.86             | 201.63          | 3.07             | 201.42          |
| MW-13S      | 3.64             | 201.28          | 3.04             | 201.88          | 3.40             | 201.52          | 3.33             | 201.59          | 3.23             | 201.69          | 3.21             | 201.71          | 3.44             | 201.48          |
| MW-14S      | 8.68             | 197.14          | 8.25             | 197.57          | 8.48             | 197.34          |                  |                 | 8.24             | 197.58          | 8.17             | 197.65          |                  |                 |
| MW-15S      | 2.73             | 201.92          | 1.94             | 202.71          | 2.74             | 201.91          | 2.82             | 201.83          | 2.42             | 202.23          | 2.59             | 202.06          | 3.10             | 201.55          |
| MW-16S      | 3.09             | 202.10          | 2.30             | 202.89          | 2.88             | 202.31          | 3.03             | 202.16          | 2.65             | 202.54          | 2.72             | 202.47          | 3.02             | 202.17          |
| MW-17S      | 5.21             | 204.03          | 4.15             | 205.09          | 3.71             | 205.53          | 3.44             | 205.80          | 3.08             | 206.16          | 2.55             | 206.69          | 2.75             | 206.49          |
| MW-18S      | 7.31             | 204.10          | 6.40             | 205.01          | 6.90             | 204.51          | 7.06             | 204.35          | 6.85             | 204.56          | 7.04             | 204.37          | 7.15             | 204.26          |
| MW-19S      | 5.56             | 204.88          | 4.79             | 205.65          | 5.88             | 204.66          | 4.96             | 205.48          | 4.69             | 205.75          | 5.76             | 204.68          | 6.50             | 203.94          |
| MW-20S      | 6.35             | 202.52          | 5.53             | 203.34          | 6.61             | 202.26          | 4.73             | 204.14          | 4.78             | 204.09          | 5.32             | 203.55          | 6.93             | 201.94          |
| MW-21S      | 9.98             | 204.99          | 9.05             | 205.92          | 8.87             | 206.10          | 8.72             | 206.25          | 8.30             | 206.67          | 8.21             | 206.76          | 8.36             | 206.61          |
| MW-22S      | 7.56             | 197.99          | 4.08             | 201.47          | 3.72             | 201.83          | 3.86             | 201.69          | 3.84             | 201.71          | 3.66             | 201.89          | 4.12             | 201.43          |
| MW-23S      | 7.85             | 196.01          | 4.21             | 199.65          | 4.54             | 199.32          | 4.20             | 199.66          | 3.97             | 199.89          | 4.24             | 199.62          | 4.83             | 199.03          |
| MW-101S     |                  |                 |                  |                 |                  |                 |                  |                 |                  |                 |                  |                 |                  |                 |
| MW-101S     | 4.73             | 202.25          | 4.14             | 202.84          | 4.30             | 202.68          | 4.57             | 202.41          | 4.07             | 202.91          | 3.85             | 203.13          | 4.23             | 202.75          |
| MW-102S     | 5.39             | 202.10          | 4.73             | 202.76          | 4.88             | 202.61          | 5.13             | 202.36          | 4.75             | 202.74          | 4.49             | 203.00          | 4.86             | 202.63          |
| MW-103S     | 3.73             | 203.89          | 2.92             | 204.70          | 4.05             | 203.57          | 3.97             | 203.65          | 3.25             | 204.37          | 3.84             | 203.78          | 4.68             | 202.94          |
| MW-104S     | 4.75             | 200.47          | 4.18             | 201.04          | 4.56             | 200.66          | 4.74             | 200.48          | 4.58             | 200.64          | 4.76             | 200.46          | 4.87             | 200.35          |
| N-1S        | 6.81             | 203.08          | 6.06             | 203.83          | 6.28             | 203.61          | 6.42             | 203.47          | 6.07             | 203.82          | 5.88             | 204.01          | 6.22             | 203.67          |
| N-1D        | 6.85             | 203.05          | 6.11             | 203.79          | 6.34             | 203.56          | 6.51             | 203.39          | 6.12             | 203.78          | 5.92             | 203.98          | 6.30             | 203.60          |
| N-2S        | 4.33             | 202.94          | 3.59             | 203.68          | 3.85             | 203.42          | 3.98             | 203.29          | 3.42             | 203.85          | 3.29             | 203.98          | 3.85             | 203.42          |
| N-2D        | 4.21             | 202.82          | 3.26             | 203.77          | 3.49             | 203.54          | 3.56             | 203.47          | 3.05             | 203.98          | 2.85             | 204.18          | 3.19             | 203.84          |
| N-3S        | 4.45             | 203.38          | 4.85             | 202.98          | 4.82             | 203.01          | 4.87             | 202.96          | 4.78             | 203.05          | 4.82             | 203.01          | 4.88             | 202.95          |
| N-3D        | 5.48             | 202.26          | 4.24             | 203.50          | 4.98             | 202.76          | 4.76             | 202.98          | 4.12             | 203.62          | 4.56             | 203.18          | 4.86             | 202.88          |
| PZ-101      | 3.93             | 204.55          | 3.09             | 205.39          | 3.62             | 204.86          | 3.91             | 204.57          | 3.32             | 205.16          | 3.40             | 205.08          | 3.89             | 204.59          |
| PZ-102      | 4.35             | 199.67          | 3.52             | 200.50          | 3.90             | 200.12          | 3.77             | 200.25          | 3.57             | 200.45          | 3.76             | 200.26          | 4.06             | 199.96          |
| PZ-105      | 3.82             | 202.12          | 3.13             | 202.81          | 3.99             | 201.95          | 3.56             | 202.38          | 3.32             | 202.62          | 3.86             | 202.08          | 4.46             | 201.48          |
| PZ-116      | 6.63             | 205.35          | 5.65             | 206.33          | 5.39             | 206.59          | 5.23             | 206.75          | 4.87             | 207.11          | 4.48             | 207.50          | 4.71             | 207.27          |
| PW-1        |                  |                 |                  |                 |                  |                 |                  |                 |                  |                 |                  |                 |                  |                 |
| PW-2        |                  |                 |                  |                 |                  |                 |                  |                 |                  |                 |                  |                 |                  |                 |
| PW-3        |                  |                 |                  |                 |                  |                 |                  |                 |                  |                 |                  |                 |                  |                 |
| PW-4        |                  |                 |                  |                 |                  |                 |                  |                 |                  |                 |                  |                 |                  |                 |

Notes:

All depths fro

NA = not ava

**TABLE C-2**

## Quarterly DNAPL Observations

*Taylor Lumber and Treating Superfund Site*

| Well Number | Date Installed | Facility Area      | Geologic Unit | DNAPL thickness (ft) |          |          |         |          |
|-------------|----------------|--------------------|---------------|----------------------|----------|----------|---------|----------|
|             |                |                    |               | 2/11/02              | 05/20/02 | 09/03/02 | 2/17/03 | 05/12/03 |
| MW-1S       | 01/12/87       | Treated Pole Sto.  | Alluvium      |                      |          |          |         |          |
| MW-2S       | 08/15/96       | Treatment Plant    | Alluvium      |                      |          |          |         |          |
| MW-2D       | 01/15/87       | Treatment Plant    | Siltstone     |                      |          |          |         |          |
| MW-4S       | 01/13/87       | Treatment Plant    | Alluvium      |                      |          |          |         |          |
| MW-4D       | 01/15/87       | Treatment Plant    | Siltstone     |                      |          |          |         |          |
| MW-6S       | 12/06/95       | Treatment Plant    | Alluvium      |                      |          |          |         |          |
| MW-6D       | 12/06/95       | Treatment Plant    | Siltstone     |                      |          |          |         |          |
| MW-7S       | 08/16/96       | Truck Shop         | Alluvium      |                      |          |          |         |          |
| MW-7D       | 08/22/96       | Truck Shop         | Siltstone     |                      |          |          |         |          |
| MW-8D       | 02/11/97       | Treatment Plant    | Siltstone     |                      |          |          |         |          |
| MW-9S       | 12/16/96       | South of Hwy 18B   | Alluvium      |                      |          |          |         |          |
| MW-10S      | 12/16/96       | South of Hwy 18B   | Alluvium      |                      |          |          |         |          |
| MW-11S      | 12/16/96       | East of R.C. Rd.   | Alluvium      |                      |          |          |         |          |
| MW-12S      | 01/14/00       | Treatment Plant    | Alluvium      |                      |          |          |         |          |
| MW-13S      | 01/12/00       | Treatment Plant    | Alluvium      |                      |          |          |         |          |
| MW-14S      | 01/12/00       | Treatment Plant    | Alluvium      |                      |          |          |         |          |
| MW-15S      | 01/13/00       | Treatment Plant    | Alluvium      |                      |          |          |         |          |
| MW-16S      | 01/13/00       | Treatment Plant    | Alluvium      |                      |          |          |         |          |
| MW-17S      | 07/31/02       | Treatment Plant    | Alluvium      |                      |          |          |         |          |
| MW-18S      | 07/31/02       | Below Soil Storage | Alluvium      |                      |          |          |         |          |
| MW-19S      | 07/31/02       | Treatment Plant    | Alluvium      |                      |          |          |         |          |
| MW-20S      | 07/30/02       | Treatment Plant    | Alluvium      |                      |          |          |         |          |
| MW-21S      | 07/30/02       | East of R.C. Rd.   | Alluvium      |                      |          |          |         |          |
| MW-22S      | 07/30/02       | East of R.C. Rd.   | Alluvium      |                      |          |          |         |          |
| MW-23S      | 07/29/02       | East of R.C. Rd.   | Alluvium      |                      |          |          |         |          |
| MW-101S     | 5/00, 7/02     | Treatment Plant    | Alluvium      |                      | trace    |          |         |          |
| MW-102S     | 05/10/00       | Treatment Plant    | Alluvium      |                      |          |          |         |          |
| MW-103S     | 05/10/00       | Treatment Plant    | Alluvium      |                      |          |          |         |          |
| MW-104S     | 05/10/00       | Treatment Plant    | Alluvium      |                      |          |          |         |          |
| N-1S        | 12/17/96       | Treatment Plant    | Alluvium      |                      |          |          |         |          |
| N-1D        | 12/17/96       | Treatment Plant    | Alluvium      | 0.1                  | trace    |          | trace   | trace    |
| N-2S        | 12/18/96       | Treatment Plant    | Alluvium      |                      |          |          |         |          |
| N-2D        | 12/17/96       | Treatment Plant    | Alluvium      | trace                |          |          |         | trace    |
| N-3S        | 12/20/96       | Treatment Plant    | Alluvium      |                      |          |          |         |          |
| N-3D        | 12/23/96       | Treatment Plant    | Alluvium      |                      |          |          |         |          |
| PZ-101      | 08/12/96       | Treatment Plant    | Alluvium      |                      |          |          |         |          |
| PZ-102      | 08/09/96       | Treatment Plant    | Alluvium      |                      |          |          |         |          |
| PZ-105      | 08/09/96       | Treatment Plant    | Alluvium      |                      |          |          |         |          |
| PZ-116      | 08/12/96       | Treated Pole Sto.  | Alluvium      |                      |          |          |         |          |



**TABLE C-3**

Quarterly Field Parameter Observations

Taylor Lumber and Treating Superfund Site

| Well    | Date       | Purge<br>Volume<br>(gallons) | Specific<br>Conductance<br>(uS/cm) | Temperature<br>(C) | pH   | ORP<br>(mV) | Dissolved<br>Oxygen<br>(mg/L) | Turbidity<br>(NTU's) |
|---------|------------|------------------------------|------------------------------------|--------------------|------|-------------|-------------------------------|----------------------|
| EW-001  | 11/22/2002 | na                           | 951                                | 16.2               | 6.9  |             |                               | 0.65                 |
|         | 05/15/2003 | na                           | 918                                | 14.2               | 6.78 |             |                               | 0.68                 |
| EW-002  | 11/22/2002 | na                           | 1222                               | 18.1               | 6.84 |             |                               | 0.48                 |
|         | 05/15/2003 | na                           | 1207                               | 14.2               | 6.62 |             |                               | 1.79                 |
| EW-003  | 11/22/2002 | na                           | 1284                               | 18.4               | 7.25 |             |                               | 0.68                 |
|         | 05/15/2003 | na                           | 1441                               | 16                 | 7.03 |             |                               | 0.95                 |
| EW-004  | 11/22/2002 | na                           | 1286                               | 16.3               | 7.04 |             |                               | 0.79                 |
|         | 05/15/2003 | na                           | 1361                               | 14.4               | 7    |             |                               | 1.11                 |
| MW-001S | 02/14/2002 | 6.0                          | 1440                               | 13.9               | 6.74 | 9.5         | 0.3                           | 2.7                  |
|         | 05/21/2002 | 6.0                          | 1485                               | 13.0               | 7.26 | 17          | 0.26                          | 0.7                  |
|         | 08/22/2002 | 6.0                          | 1471                               | 15.2               | 6.83 | 23          | 0.3                           | 0.4                  |
|         | 11/21/2002 | 6                            | 1446                               | 15.9               | 7.18 | 12          | 0.45                          | 0.51                 |
|         | 02/19/2003 | 6.5                          | 1690                               | 14                 | 7.36 | 4.3         | 0.84                          | 0.56                 |
| MW-002S | 09/04/2002 | 7.5                          | 1180                               | 16.6               | 6.59 | -79         | 0.27                          | 2.6                  |
| MW-004S | 09/04/2002 | 6.0                          | 725                                | 16.0               | 6.76 | -16         | 0.39                          | 2.7                  |
| MW-006D | 02/12/2002 | 14.0                         | 3543                               | 13.7               | 7.65 | -157.6      | 0.3                           | 1.0                  |
|         | 05/20/2002 | 14.0                         | 3456                               | 13.5               | 7.35 | -95         | 0.34                          | 3.1                  |
|         | 08/21/2002 | 13.0                         | 3619                               | 13.9               | 7.25 | -107        | 0.33                          | 4.3                  |
|         | 11/19/2002 | 13.5                         | 3630                               | 14.3               | 7.82 | -144        | 0.46                          | 7.44                 |
| MW-006S | 02/13/2002 | 7.0                          | 1077                               | 11.2               | 6.61 | 5.5         | 0.36                          | 1.2                  |
|         | 05/20/2002 | 5.0                          | 1123                               | 12.2               | 7.05 | 35          | 0.26                          | 1.1                  |
|         | 08/21/2002 | 5.0                          | 1160                               | 17.5               | 6.53 | -17         | 0.34                          | 1.1                  |
|         | 09/05/2002 | 4.5                          | 1207                               | 17.3               | 6.81 | -9.1        | 0.49                          | 0.5                  |
|         | 11/19/2002 | 4.5                          | 1149                               | 15.7               | 6.85 | 6.7         | 0.45                          | 1.26                 |
| MW-007D | 02/14/2002 | 15.0                         | 2833                               | 13.1               | 7.50 | -168        | 0.38                          | 0.6                  |
|         | 05/22/2002 | 15.0                         | 2814                               | 13.2               | 7.80 | -175        | 0.28                          | 1.0                  |
|         | 08/26/2002 | 13.5                         | 3025                               | 14.0               | 7.46 | -104        | 0.47                          | 2.2                  |
|         | 11/20/2002 | 13.5                         | 2831                               | 13.5               | 7.60 | -15.7       | 0.61                          | 2.69                 |
| MW-007S | 02/14/2002 | 9.0                          | 2382                               | 12.7               | 7.42 | -187        | 0.29                          | 1.7                  |
|         | 05/22/2002 | 9.0                          | 2382                               | 12.5               | 7.62 | -175        | 0.33                          | 1.2                  |
|         | 08/26/2002 | 9.0                          | 2458                               | 12.9               | 7.38 | -172        | 0.38                          | 0.6                  |
|         | 11/20/2002 | 7.5                          | 2534                               | 13.2               | 7.62 | -192        | 0.6                           | 0.73                 |
| MW-008D | 09/03/2002 | 12.0                         | 2907                               | 16.7               | 7.70 | -226        | 0.27                          | 1.2                  |
| MW-009S | 02/12/2002 | 4.5                          | 128                                | 10.2               | 5.98 | 136.0       | 4.0                           | 1.5                  |
|         | 08/22/2002 | 3.0                          | 243                                | 13.3               | 6.90 | 41          | 0.56                          | 0.3                  |
|         | 09/05/2002 | 3.0                          | 24.5                               | 13.7               | 7.04 | 13.6        | 0.49                          | 0.6                  |
|         | 11/20/2002 | 3                            | 268                                | 13.8               | 7.13 | 17          | 1.37                          | 0.99                 |
|         | 02/19/2003 | 4                            | 119                                | 10.1               | 6.73 | 38          | 6.7                           | 4.03                 |
|         | 05/13/2003 | 3.5                          | 236                                | 11.2               | 6.82 | 36          | 2.32                          | 0.83                 |
|         | 05/21/2002 | 3.0                          | 237                                | 11.3               | 7.33 | 52          | 0.6                           | 0.9                  |

**TABLE C-3**

## Quarterly Field Parameter Observations

Taylor Lumber and Treating Superfund Site

| Well    | Date       | Purge<br>Volume<br>(gallons) | Specific<br>Conductance<br>(uS/cm) | Temperature<br>(C) | pH   | ORP<br>(mV) | Dissolved<br>Oxygen<br>(mg/L) | Turbidity<br>(NTU's) |
|---------|------------|------------------------------|------------------------------------|--------------------|------|-------------|-------------------------------|----------------------|
| MW-010S | 05/23/2002 | 0.6                          | 335                                | 10.6               | 6.99 | -95         | 0.88                          | 2.8                  |
|         | 08/27/2002 | 0.5                          | 368                                | 13.7               | 6.75 | 18          | 1.9                           | 0.4                  |
|         | 11/20/2002 | 0.75                         | 316                                | 13.4               | 6.97 | -0.8        | 4.66                          | 2.5                  |
|         | 02/19/2003 | 1.2                          | 264                                | 10.7               | 6.95 | 8.4         | 3.64                          | 6.4                  |
|         | 05/13/2003 | 0.75                         | 310                                | 11.3               | 6.65 |             |                               | 3.85                 |
|         | 02/14/2002 | 1.0                          | 236                                | 10.5               | 6.44 | -85.9       | 1.24                          | 3.3                  |
| MW-011S | 02/19/2003 | 9                            | 563                                | 11.9               | 7.16 | -0.5        | 0.78                          | 1.03                 |
|         | 02/14/2002 | 8.5                          | 527                                | 11.8               | 6.52 | 94          | 0.21                          | 1.0                  |
|         | 05/21/2002 | 8.0                          | 1410                               | 12.0               | 7.29 | 60          | 0.24                          | 1.2                  |
|         | 08/27/2002 | 7.5                          | 1581                               | 14.1               | 7.03 | -0.4        | 0.3                           | 0.4                  |
|         | 11/21/2002 | 8                            | 1148                               | 14.2               | 7.19 | 2.4         | 0.49                          | 0.41                 |
|         | 05/14/2003 | 9                            | 1103                               | 12.5               | 7.04 | -9.6        | 0.57                          | 0.81                 |
| MW-012S | 02/13/2002 | 40.0                         | 1082                               | 11.7               | 6.62 | -28.2       | 0.35                          | 3.6                  |
|         | 05/20/2002 | 37.0                         | 1121                               | 12.9               | 7.09 | -38         | 0.3                           | 2.3                  |
|         | 11/19/2002 | 37                           | 1133                               | 16                 | 6.93 | -38         | 0.62                          | 6.03                 |
|         | 08/21/2002 | 33.0                         | 1175                               | 16.9               | 6.85 | -28         | 0.51                          | 6.4                  |
| MW-013S | 02/13/2002 | 7.0                          | 1052                               | 12.7               | 6.19 | 38.4        | 0.36                          | 0.9                  |
|         | 05/20/2002 | 6.0                          | 1117                               | 13.2               | 6.64 | 43          | 0.25                          | 1.0                  |
|         | 08/21/2002 | 6.0                          | 1306                               | 17.0               | 6.48 | 19          | 0.31                          | 0.6                  |
|         | 11/19/2002 | 6                            | 1110                               | 16.5               | 6.61 | 37          | 0.48                          | 1.62                 |
|         | 02/17/2003 | 6                            | 1080                               | 13.2               | 6.40 | 29          | 1.07                          | 0.94                 |
|         | 05/16/2003 | 6                            | 1137                               | 12.7               | 6.36 | 18          | 0.63                          | 1.78                 |
| MW-014S | 02/13/2002 | 3.8                          | 1570                               | 14.3               | 6.05 | -71.0       | 0.32                          | 0.5                  |
|         | 05/22/2002 | 3.5                          | 1384                               | 14.2               | 6.54 | -5.5        | 0.25                          | 0.4                  |
|         | 09/04/2002 | 4.5                          | 1330                               | 20.4               | 6.04 | 32          | 0.57                          | 0.3                  |
| MW-015S | 02/13/2002 | 5.5                          | 633                                | 11.1               | 5.88 | 105.7       | 0.29                          | 0.5                  |
|         | 05/21/2002 | 5.0                          | 644                                | 11.0               | 6.52 | 113         | 0.26                          | 0.7                  |
|         | 08/21/2002 | 5.0                          | 710                                | 15.8               | 6.01 | 50          | 0.38                          | 0.3                  |
|         | 11/20/2002 | 5                            | 670                                | 15.8               | 6.73 | 76          | 0.46                          | 0.91                 |
|         | 02/20/2003 | 6                            | 640                                | 11.6               | 6.89 | 24.9        | 0.86                          | 0.62                 |
|         | 05/15/2003 | 5                            | 584                                | 12.1               | 6.26 | 57          | 0.53                          | 0.71                 |
| MW-016S | 02/13/2002 | 6.0                          | 645                                | 12.8               | 6.28 | 98.3        | 0.3                           | 13.0                 |
|         | 05/22/2002 | 6.0                          | 615                                | 12.7               | 6.70 | 96          | 0.24                          | 3.1                  |
|         | 08/21/2002 | 6.0                          | 585                                | 15.5               | 6.93 | 14.8        | 0.43                          | 4.9                  |
|         | 11/18/2002 | 6                            | 621                                | 16.2               | 7.21 | 52          | 0.5                           | 5.1                  |
|         | 02/18/2003 | 6                            | 683                                | 13.1               | 7.15 | 21          | 0.98                          | 1.26                 |
|         | 05/15/2003 | 6                            | 692                                | 13                 | 6.53 | -115        | 0.49                          | 1.12                 |
| MW-017S | 09/03/2002 | 9.0                          | 1780                               | 15.8               | 6.83 | -13         | 0.29                          | 0.8                  |
|         | 11/20/2002 | 7.5                          | 1846                               | 16.1               | 7.40 | -35         | 0.45                          | 0.37                 |
|         | 02/18/2003 | 8                            | 1873                               | 14.5               | 7.53 | -10.1       | 1.01                          | 1.2                  |
|         | 05/13/2003 | 9                            | 1791                               | 14.2               | 6.75 | 17          | 0.65                          | 0.76                 |
| MW-018S | 08/26/2002 | 6.0                          | 414                                | 16.0               | 7.02 | 24          | 5.4                           | 12.0                 |
|         | 11/20/2002 | 5.5                          | 166                                | 15.5               | 6.85 | 64          | 5.89                          | 7.32                 |
|         | 02/20/2003 | 6                            | 364                                | 12.2               | 7.72 | -18         | 1.08                          | 3.43                 |

**TABLE C-3**

## Quarterly Field Parameter Observations

Taylor Lumber and Treating Superfund Site

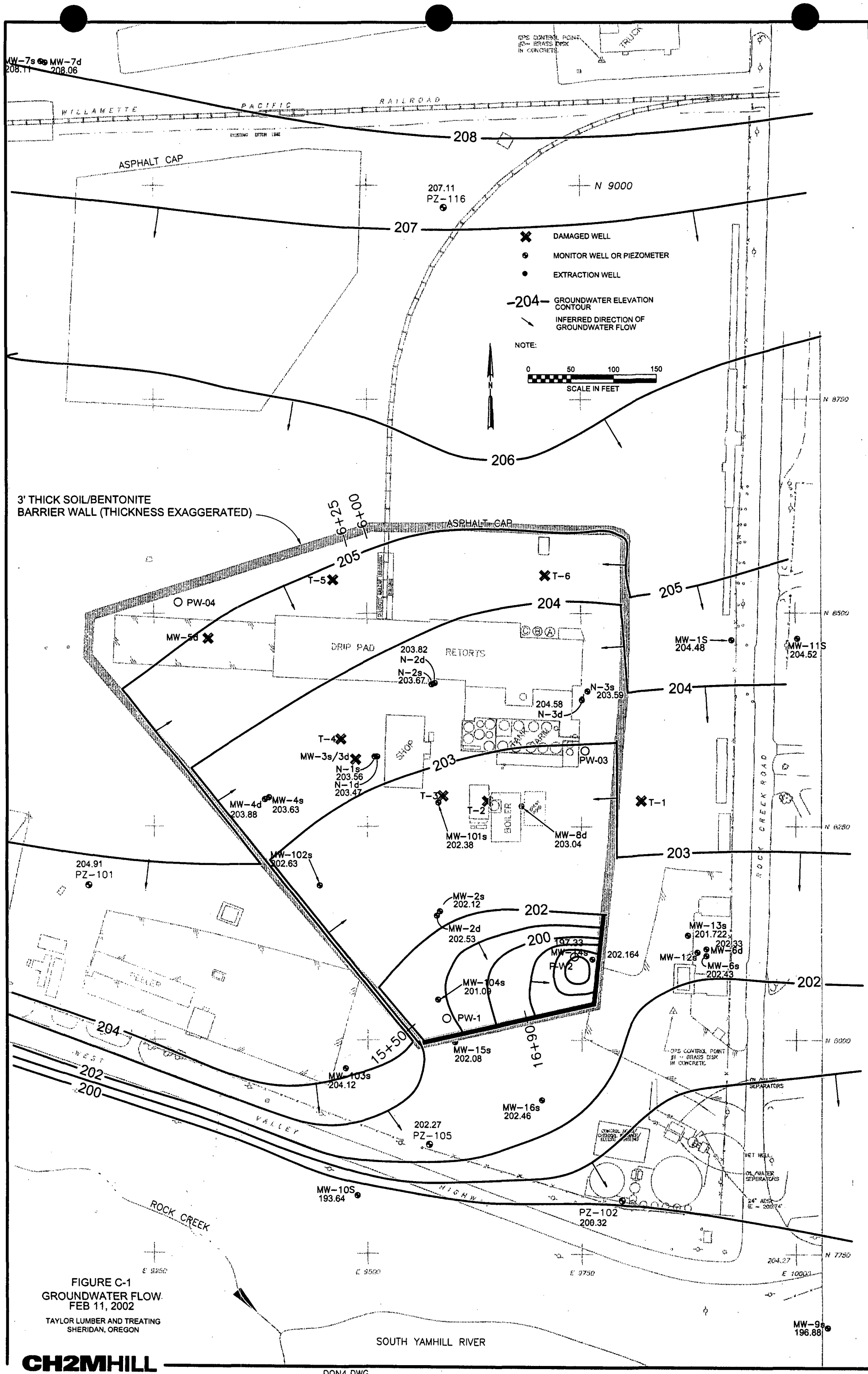
| Well    | Date       | Purge<br>Volume<br>(gallons) | Specific<br>Conductance<br>(uS/cm) | Temperature<br>(C) | pH   | ORP<br>(mV) | Dissolved<br>Oxygen<br>(mg/L) | Turbidity<br>(NTU's) |
|---------|------------|------------------------------|------------------------------------|--------------------|------|-------------|-------------------------------|----------------------|
| MW-019S | 05/13/2003 | 6                            | 415                                | 13.1               | 7.36 | 72          | 0.79                          | 4.61                 |
|         | 08/26/2002 | 6.0                          | 261                                | 17.2               | 6.11 | 54          | 1.33                          | 4.6                  |
|         | 11/19/2002 | 6.5                          | 245                                | 15.8               | 6.28 | 144         | 0.67                          | 2.74                 |
| MW-020S | 05/13/2003 | 6                            | 194                                | 13                 | 6.12 | 107         | 0.81                          | 6.05                 |
|         | 02/18/2003 | 7                            | 202                                | 11.8               | 6.65 | 6.1         | 1.36                          | 9.76                 |
|         | 09/03/2002 | 4.5                          | 629                                | 17.1               | 6.36 | -3          | 0.31                          | 7.1                  |
| MW-021S | 11/19/2002 | 6                            | 314                                | 14.2               | 6.55 | 125         | 1.71                          | 45                   |
|         | 05/13/2003 | 6                            | 233                                | 13.1               | 6.54 | 68          | 0.64                          | 17                   |
|         | 02/18/2003 | 7                            | 237                                | 9.8                | 6.77 | 38          | 2.71                          | 19                   |
| MW-022S | 09/03/2002 | 9.0                          | 1209                               | 13.6               | 7.35 | -120        | 0.35                          | 1.1                  |
|         | 11/21/2002 | 9                            | 1165                               | 13.3               | 7.29 | -109        | 0.59                          | 0.8                  |
|         | 02/20/2003 | 10                           | 1311                               | 13.4               | 7.85 | -131        | 0.88                          | 0.57                 |
| MW-023S | 05/15/2003 | 10                           | 1318                               | 13.4               | 7.44 | -133        | 0.64                          | 1.71                 |
|         | 09/03/2002 | 4.5                          | 325                                | 11.4               | 7.16 | -132        | 0.38                          | 2.1                  |
|         | 11/21/2002 | 5                            | 351                                | 11.7               | 7.27 | -171        | 0.69                          | 0.55                 |
| MW-101S | 02/19/2003 | 7.5                          | 368                                | 10.8               | 7.24 | -170        | 0.81                          | 0.71                 |
|         | 05/14/2003 | 7                            | 379                                | 10.9               | 7.15 | -199        | 0.62                          | 0.56                 |
|         | 09/03/2002 | 4.5                          | 1965                               | 12.3               | 6.95 | 65          | 0.57                          | 2.0                  |
| MW-102S | 11/21/2002 | 5.5                          | 2435                               | 12.6               | 7.12 | -27         | 0.46                          | 1.03                 |
|         | 02/19/2003 | 7.5                          | 2277                               | 11.1               | 7.24 | -31         | 0.79                          | 0.62                 |
|         | 05/15/2003 | 7                            | 2079                               | 10.8               | 7.11 | 5.5         | 0.75                          | 0.81                 |
| MW-103S | 02/15/2002 | 7.5                          | 1561                               | 15.3               | 7.19 | -134        | 0.26                          | 6.8                  |
|         | 05/23/2002 | 7.5                          | 1570                               | 14.9               | 7.38 | -95         | 0.21                          | 3.1                  |
|         | 09/05/2002 | 30.0                         | 1509                               | 17.4               | 7.07 | -74         | 0.24                          | 4.1                  |
| MW-104S | 11/22/2002 | 30                           | 1537                               | 17.8               | 7.34 | -127        | 0.51                          | 8.35                 |
|         | 05/16/2003 | 30                           | 1581                               | 15.1               | 7.33 | -111        | 0.56                          | 6.1                  |
|         | 09/04/2002 | 6.0                          | 981                                | 16.3               | 6.64 | -62         | 0.36                          | 2.2                  |
| MW-104S | 02/12/2002 | 6.0                          | 307.7                              | 12.5               | 5.89 | 153.8       | 0.31                          | 2.0                  |
|         | 05/22/2002 | 6.0                          | 325                                | 12.8               | 6.69 | 120         | 0.26                          | 1.2                  |
|         | 08/22/2002 | 6.0                          | 383                                | 15.5               | 6.36 | 60          | 0.53                          | 0.6                  |
| MW-104S | 11/19/2002 | 6.5                          | 371                                | 17.1               | 6.49 | 131         | 0.58                          | 0.29                 |
|         | 02/18/2003 | 7                            | 386                                | 13.3               | 6.74 | 62          | 1.07                          | 1.89                 |
|         | 05/16/2003 | 6                            | 364                                | 13.2               | 6.21 | 100         | 0.53                          | 2                    |
| MW-104S | 02/13/2002 | 5.0                          | 906                                | 13.7               | 6.58 | -112.3      | 0.31                          | 1.2                  |
|         | 05/23/2002 | 4.5                          | 930                                | 14.2               | 6.79 | -16         | 0.24                          | 0.5                  |
|         | 08/27/2002 | 6.0                          | 816                                | 17.9               | 6.21 | 16          | 0.4                           | 0.9                  |
| N-1D    | 11/22/2002 | 6                            | 1059                               | 17.7               | 6.77 | -22         | 0.52                          | 0.84                 |
|         | 05/15/2003 | 4.5                          | 1036                               | 13.9               | 6.51 | -201        | 0.52                          | 1.26                 |
|         | 09/04/2002 | 6.5                          | 691                                | 16.3               | 6.53 | -90         | 0.25                          | 4.2                  |
| N-2D    | 09/04/2002 | 6.0                          | 1349                               | 16.5               | 7.02 | -105        | 0.22                          | 8.4                  |
| N-3D    | 09/05/2002 | 7.5                          | 1140                               | 17.8               | 7.26 | -138        | 0.31                          | 9.0                  |
| PW-001  | 02/14/2002 | na                           | 854                                | 14.5               | 6.88 | -13.2       | 0.48                          | na                   |
|         | 05/22/2002 | na                           | 918                                | 13.5               | 7.03 | 30          | 0.97                          | 0.3                  |
| PW-002  | 02/14/2002 | na                           | 1341                               | 14.9               | 6.43 | 26          | 3.03                          | 2.1                  |

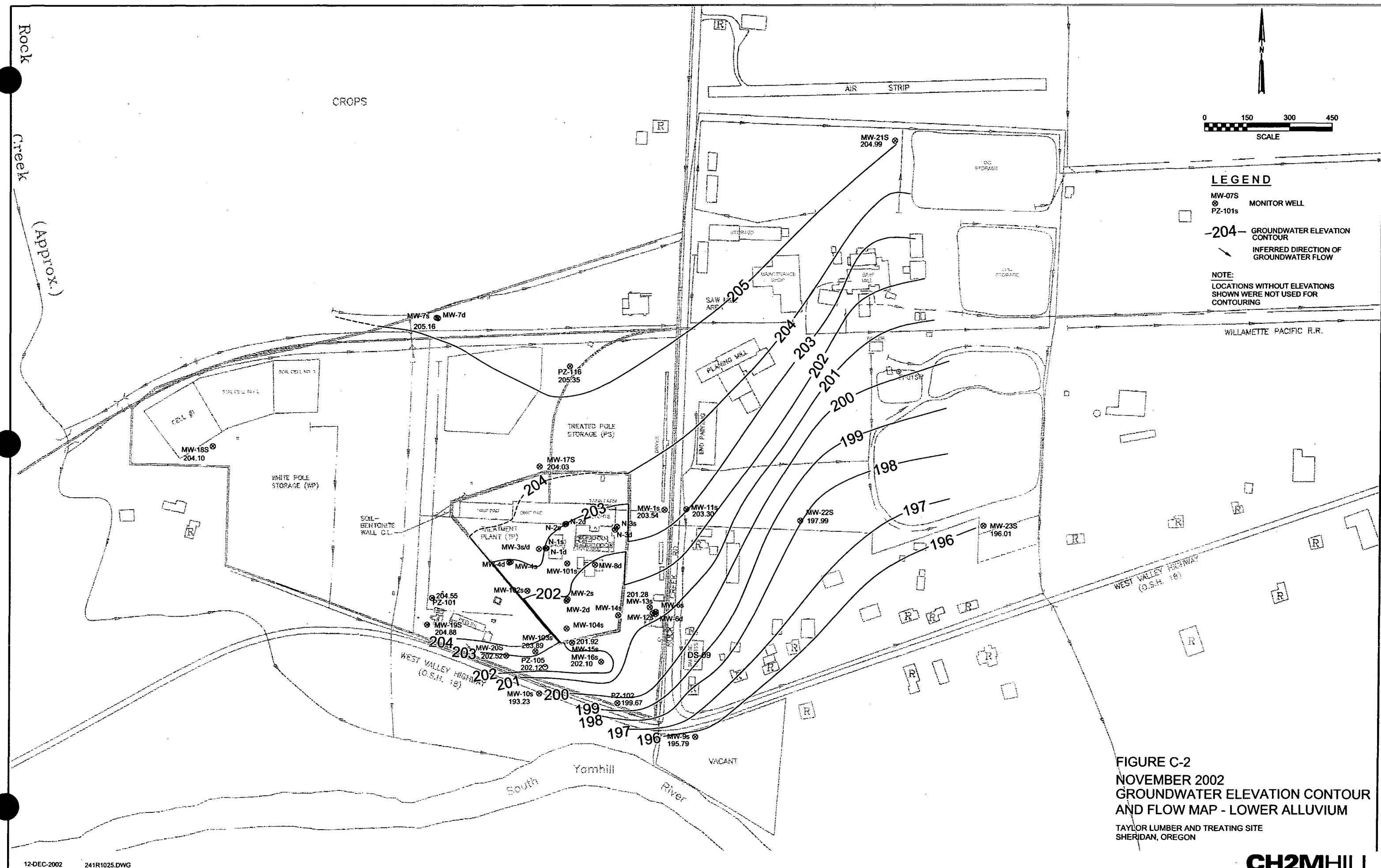
TABLE C-3

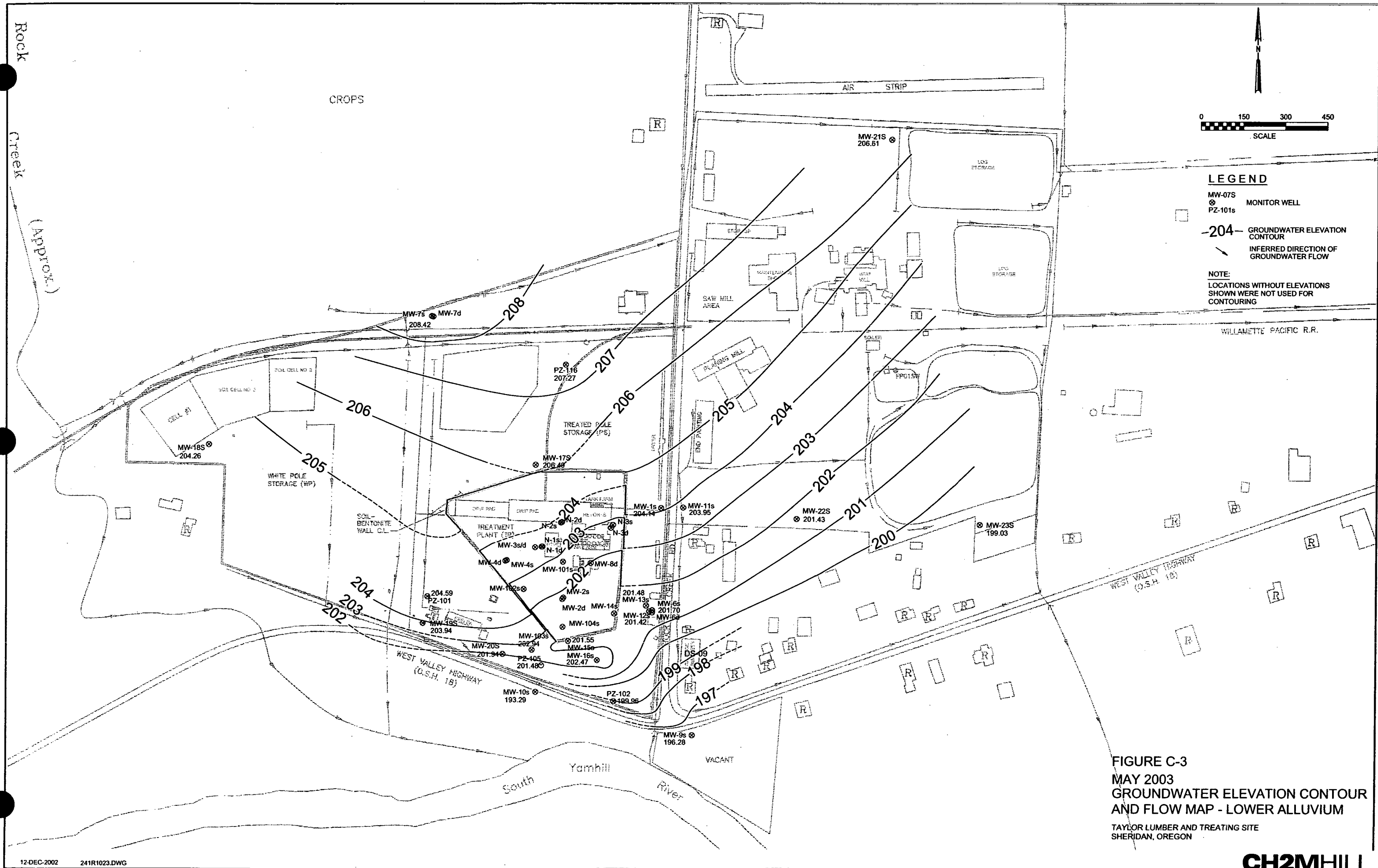
## Quarterly Field Parameter Observations

Taylor Lumber and Treating Superfund Site

| Well   | Date       | Purge<br>Volume<br>(gallons) | Specific<br>Conductance<br>(uS/cm) | Temperature<br>(C) | pH   | ORP<br>(mV) | Dissolved<br>Oxygen<br>(mg/L) | Turbidity<br>(NTU's) |
|--------|------------|------------------------------|------------------------------------|--------------------|------|-------------|-------------------------------|----------------------|
| PW-003 | 05/22/2002 | na                           | 1266                               | 14.5               | 6.76 | 18          | 0.58                          | 1.3                  |
|        | 05/22/2002 | na                           | 1272                               | 16.4               | 7.21 | 39          | 1.61                          | 1.1                  |
| PW-004 | 05/22/2002 | na                           | 1156                               | 14.3               | 7.24 | 27          | 1.8                           | 2.0                  |
| PZ-101 | 02/14/2002 | 6.0                          | 292.5                              | 11.4               | 5.98 | 40.1        | 0.38                          | 1.8                  |
|        | 05/21/2002 | 6.0                          | 308                                | 11.7               | 6.57 | 39          | 0.81                          | 3.8                  |
|        | 08/26/2002 | 6.0                          | 316                                | 16.3               | 6.10 | 19          | 0.79                          | 1.7                  |
|        | 11/22/2002 | 5.5                          | 293                                | 14.6               | 6.46 | 39          | 0.93                          | 6.51                 |
| PZ-102 | 05/14/2003 | 5.5                          | 287                                | 12.1               | 6.26 | -20         | 0.96                          | 1.62                 |
|        | 02/12/2002 | 7.0                          | 507                                | 12.7               | 6.76 | -49.2       | 0.3                           | 0.6                  |
|        | 05/23/2002 | 6.0                          | 421                                | 12.1               | 7.29 | -24         | 0.23                          | 0.8                  |
|        | 08/21/2002 | 6.0                          | 548                                | 14.3               | 6.77 | 66          | 0.47                          | 0.7                  |
|        | 11/18/2002 | 6.5                          | 325                                | 15.3               | 7.17 | 32          | 0.57                          | 0.55                 |
|        | 05/16/2003 | 7                            | 485                                | 12.3               | 6.97 | -73         | 0.54                          | 0.49                 |
| PZ-105 | 02/17/2003 | 7                            | 592                                | 12.7               | 6.90 | -74         | 1.1                           | 0.91                 |
|        | 02/12/2002 | 5.5                          | 123.2                              | 11.0               | 5.83 | 162.1       | 0.48                          | 11.0                 |
|        | 05/23/2002 | 4.6                          | 136                                | 11.7               | 6.36 | 127         | 0.41                          | 4.9                  |
|        | 08/22/2002 | 6.0                          | 162                                | 15.3               | 6.10 | 69          | 0.44                          | 1.6                  |
|        | 11/18/2002 | 5                            | 170                                | 14.3               | 6.48 | 99          | 0.47                          | 4.04                 |
|        | 02/18/2003 | 6                            | 139                                | 11.2               | 6.94 | 35.4        | 1                             | 22                   |
| PZ-116 | 05/16/2003 | 4.5                          | 138                                | 12                 | 6.24 | 72          | 0.54                          | 8.7                  |
|        | 02/15/2002 | 9.0                          | 1224                               | 14.1               | 7.34 | -22         | 0.36                          | 0.7                  |
|        | 05/23/2002 | 9.0                          | 1208                               | 13.6               | 7.44 | 3.4         | 0.21                          | 0.9                  |
|        | 08/22/2002 | 9.0                          | 1137                               | 14.0               | 7.07 | 50          | 0.34                          | 0.3                  |
|        | 11/22/2002 | 7.5                          | 1292                               | 14.6               | 7.31 | -27         | 0.48                          | 0.82                 |
|        | 05/14/2003 | 9                            | 1306                               | 13.7               | 7.28 | -22         | 0.85                          | 0.38                 |
| RW-01  | 02/15/2002 | 160.0                        | 264                                | 11.3               | 6.14 | 79          | 1.15                          | 2.8                  |
|        | 05/22/2002 | 160.0                        | 251                                | 10.9               | 6.61 | 87          | 0.51                          | 1.0                  |
|        | 08/26/2002 | 20.0                         | 279                                | 14.6               | 6.08 | 23          | 0.3                           | 0.7                  |
|        | 11/21/2002 | 22                           | 283                                | 13.3               | 6.40 | 61          | 1.31                          | 1.48                 |
| RW-02  | 05/14/2003 | 15                           | 252                                | 11.6               | 6.24 | -10         | 0.73                          | 0.85                 |
|        | 02/15/2002 | 160.0                        | 155                                | 9.8                | 6.02 | 64          | 0.22                          | 1.8                  |
|        | 05/21/2002 | 18.0                         | 492                                | 11.3               | 6.72 | -85         | 0.24                          | 0.6                  |
|        | 08/26/2002 | 17.0                         | 521                                | 14.1               | 6.73 | -64         | 0.21                          | 0.9                  |
|        | 11/21/2002 | 17                           | 197                                | 13.8               | 6.78 | 30          | 2.63                          | 5.15                 |
|        | 05/14/2003 | 15                           | 266                                | 13.1               | 6.51 | -134        | 0.58                          | 1.98                 |







**Attachment C1**  
**Well Development Data**  
**August 2002**

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| Taylor Lumber                         |  | Well Development Data                 |  | 169241.FI.Ø1                           |  |                         |  |
|---------------------------------------|--|---------------------------------------|--|--|--|-------------------------|--|
| Well Number <u>MW17s</u>              |  | Date Development Began <u>8-29-02</u> |  | Date Development Ended <u>8-29-02</u>  |  | Total Hours <u>2:30</u> |  |
| Borehole Diameter _____               |  | Personnel <u>B. Colton</u>            |  | Method <u>Peristaltic Pump + Surge</u> |  |                         |  |
| Total Well Depth <u>18.95'</u>        |  |                                       |  |  |  |                         |  |
| Screen Interval _____                 |  |                                       |  |  |  |                         |  |
| Depth to Water (Initial) <u>3.69'</u> |  |                                       |  |  |  |                         |  |
| Depth to Water (Final) _____          |  |                                       |  |  |  |                         |  |

| Time | Depth to Water (fbs) | Discharge Rate (gpm)                                 | Cumulative Gallons                             | EC Micromhos /cm @ 25°C | TEMP °C | pH   | Appearance  |
|------|----------------------|--|--|-------------------------|---------|------|-------------|
| 0830 | 3.69'                | Ø  | Surge entire length of screen                  |                         |         |      |             |
| 0840 | 3.69'                | ~Ø   | - pump on, flowrate vs. drawdown, pump + surge |                         |         |      |             |
| 0842 | 4.23'                | 0.2  | ~0.4   | 1756                    | 15.7    | 7.48 | Very turbid |
| 0850 | 3.90                 | - increase Q to 0.6 gpm, pump + surge - bottom       |  |                         |         |      |             |
| 0900 | 4.65                 | - increase Q to 0.9 gpm, pump + surge from midscreen |  |                         |         |      |             |
| 0910 | 5.10                 | - increase Q to ~1.2 gpm, pump + surge from top      |  |                         |         |      |             |
| 0920 | 5.82                 | - increase Q to ~1.6 gpm, pump + surge - bottom      |  |                         |         |      |             |
| 0930 | 4.10                 | - increase Q to 2.0 gpm, pump + surge - midscreen    |  |                         |         |      |             |
| 0940 | 6.85                 | ~2.0   | ~82  | 1809                    | 16.1    | 6.94 | less turbid |
| 0950 | 7.43                 | "  | pump + surge from top of screen                |                         |         |      |             |
| 1000 | 7.45                 | "  | pump + surge from bottom                       |                         |         |      |             |
| 1000 | —                    | —  | ~442   | pump off, dump water    |         |      |             |
| 1015 | 4.35                 | ~2.0   | ~120   | pump on, continue       |         |      |             |
| 1025 | 6.80                 | "  | ~140   | 1752                    | 15.7    | 6.67 | less turbid |
| 1035 | 6.90                 | "  | ~160   | 1756                    | 15.8    | 6.80 | 130 NTU     |
| 1040 | 6.95                 | 0.6  | - Reduce Q to ~0.6 gpm                         |                         |         |      |             |
| 1050 | 4.88                 | "  | ~186   | 1812                    | 16.2    | 6.85 | 80 NTU      |
| 1055 | 4.80                 | "  | ~189   | 1802                    | 16.4    | 6.88 | 15 NTU      |
| 1100 | 4.75                 | "  | ~192   | 1807                    | 16.5    | 6.92 | 6.1 NTU     |

Comments:

| Well Development Data                |  |  |  | 16924/ FI. 01                         |  |  |  |
|--------------------------------------|--|--|--|---------------------------------------|--|--|--|
| Taylor Lumber                        |  |  |  |                                       |  |  |  |
| Well Number <u>MW18s</u>             |  |  |  | Date Development Began <u>8-23-02</u> |  |  |  |
| Borehole Diameter _____              |  |  |  | Date Development Ended <u>8-23-02</u> |  |  |  |
| Total Well Depth <u>17.85</u>        |  |  |  | Total Hours <u>2:20</u>               |  |  |  |
| Screen Interval _____                |  |  |  | Personnel <u>B. Collins</u>           |  |  |  |
| Depth to Water (Initial) <u>7.97</u> |  |  |  | Method _____                          |  |  |  |
| Depth to Water (Final) _____         |  |  |  | Peristaltic pump + surge              |  |  |  |

| Time                              | Depth to Water (ftgs) | Discharge Rate (gpm) | Cumulative Gallons                    | EC Micromhos /cm @ 25°C | TEMP °C | pH   | NTU / Appearance |
|-----------------------------------|-----------------------|----------------------|---------------------------------------|-------------------------|---------|------|------------------|
| 0830                              | 7.97'                 | —                    | surge entire screen                   |                         |         |      |                  |
| 0840                              | pump on, pump + surge |                      | drawdown vs. Q                        |                         |         |      |                  |
| 0840                              | 7.97                  | ~0.3                 | 0.2                                   | 436                     | 16.0    | 7.72 | Very turbid      |
| 0850                              | 8.52                  | ~0.3                 | pump + surge from bottom              |                         |         |      |                  |
| 0900                              | 9.80                  | "                    | pump + surge from midscreen           |                         |         |      |                  |
| 0910                              | 10.50                 | "                    | pump + surge from top of water column |                         |         |      |                  |
| 0915                              | 10.95                 | "                    | ~10                                   | 423                     | 16.6    | 7.02 | sl. less turbid  |
| 0920                              | 12.45                 | ~0.25                | pump + surge from bottom              |                         |         |      |                  |
| 0930                              | 13.40                 | "                    | ~14                                   | 421                     | 16.3    | 7.18 | no change        |
| 0940                              | 13.90                 | ~0.2                 | pump + surge from bottom              |                         |         |      |                  |
| 0950                              | 14.55                 | "                    | ~19                                   | 440                     | 16.2    | 7.27 | sl. less T.      |
| 1000                              | 14.70                 | "                    | pump off, allow recovery              |                         |         |      |                  |
| 1535                              | 8.15                  | ~0.1                 | 19.2                                  | 471                     | 18.7    | 7.90 | less turbid      |
| — No further surging —            |                       |                      |                                       |                         |         |      |                  |
| 1555                              | 9.78                  | ~0.1                 | ~22                                   | 421                     | 18.5    | 7.20 | 122 NTU          |
| 1615                              | 10.25                 | "                    | ~25                                   | 421                     | 18.2    | 7.11 | 35 NTU           |
| 1625                              | 10.46                 | "                    | ~26                                   | 418                     | 18.2    | 7.10 | 20 NTU           |
| 1635                              | 10.61                 | "                    | ~27                                   | 416                     | 18.2    | 7.08 | 18 NTU           |
| — pump off development complete — |                       |                      |                                       |                         |         |      |                  |
| Comments:                         |                       |                      |                                       |                         |         |      |                  |

| Taylor Lumber                |  | Well Development Data                 |  | 169241 FI.Ø1                           |  |                             |  |
|------------------------------|--|---------------------------------------|--|--|--|-----------------------------|--|
| Well Number <u>MW19s</u>     |  | Date Development Began <u>8-23-02</u> |  | Date Development Ended <u>8-23-02</u>  |  |                             |  |
| Borehole Diameter _____      |  | Total Well Depth <u>18.15'</u>        |  | Total Hours <u>2:40</u>                |  | Personnel <u>B. Collier</u> |  |
| Screen Interval _____        |  | Depth to Water (Initial) <u>8.32'</u> |  | Method <u>Peristaltic pump + surge</u> |  |                             |  |
| Depth to Water (Final) _____ |  |                                       |  |  |  |                             |  |

| Time | Depth to Water (fbs) | Discharge Rate (gpm) | Cumulative Gallons                      | EC Micromhos /cm @ 25°C | TEMP °C | pH   | NTU / Appearance |
|------|----------------------|----------------------|---|-------------------------|---------|------|------------------|
| 1030 | 8.32                 | Ø                    | Surge entire screened area              |                         |         |      |                  |
| 1040 | 8.32                 | pump on              | drawdown vs Q, pump + surge             |                         |         |      |                  |
| 1040 | 8.32                 | ~0.25                | ~0.2                                    | 265                     | 18.4    | 6.91 | Very turbid      |
| 1050 | 8.90                 | "                    | - pump + surge screen from bottom       |                         |         |      |                  |
| 1100 | 9.51                 | "                    | - pump + surge screen from middle       |                         |         |      |                  |
| 1110 | 9.95                 | "                    | ~7                                      | 298                     | 17.9    | 6.26 | sl. less T.      |
| 1120 | 10.30                | "                    | - pump + surge screen from top of water |                         |         |      |                  |
| 1125 | 10.55                | ~0.25                | ~12                                     | 281                     | 18.0    | 6.24 | less turbid      |
| 1130 | 10.70                | "                    | - pump + surge screen from bottom       |                         |         |      |                  |
| 1140 | 10.87                | "                    | - pump + surge screen from mid screen   |                         |         |      |                  |
| 1145 | 10.95                | "                    | ~17                                     | 286                     | 17.9    | 6.23 | no change        |
| 1150 | 11.02                | "                    | - pump + surge screen from bottom       |                         |         |      |                  |
| 1205 | —                    | "                    | ~22                                     | 253                     | 17.9    | 6.09 | less turbid      |
| 1220 | 11.72                | "                    | pump + surge screen from mid screen     |                         |         |      |                  |
| 1225 | 11.75                | "                    | ~27                                     | 248                     | 17.9    | 6.05 | sl. less T.      |
| 1245 | 13.40                | ~0.1                 | ~32                                     | 244                     | 18.0    | 6.02 | 352 NTU          |
| 1255 | 13.38                | "                    | ~33                                     | 242                     | 17.9    | 6.03 | 124 NTU          |
| 1305 | 13.32                | "                    | ~34                                     | 242                     | 17.9    | 6.02 | 85 NTU           |
| 1320 | 13.20                | "                    | ~35.5                                   | 245                     | 18.0    | 6.05 | 15 NTU           |

Comments: pump off at 1320

| Taylor Lumber                |  | Well Development Data                 |  | 169241. FI. Ø1                         |  |                             |  |
|------------------------------|--|---------------------------------------|--|--|--|-----------------------------|--|
| Well Number <u>MW 20s</u>    |  | Date Development Began <u>8-23-02</u> |  | Date Development Ended <u>8-28-02</u>  |  |                             |  |
| Borehole Diameter _____      |  | Total Well Depth <u>17.15</u>         |  | 1140 Total Hours <u>01:55 PM</u>       |  | Personnel <u>B. Collins</u> |  |
| Screen Interval _____        |  | Depth to Water (Initial) <u>9.31</u>  |  | Method <u>Peristaltic pump + surge</u> |  |                             |  |
| Depth to Water (Final) _____ |  |                                       |  |  |  |                             |  |

| Time         | Depth to Water (ftgs) | Discharge Rate (gpm)                  | Cumulative Gallons                 | EC Micromhos /cm @ 25°C | TEMP °C | pH   | NTU / Appearance |
|--------------|-----------------------|---------------------------------------|------------------------------------|-------------------------|---------|------|------------------|
| 1350         | 9.31                  | Ø                                     | Surge entire screened area         |                         |         |      |                  |
| 1355         | 9.31                  | pump on, drawdown vs. Q, pump + surge |                                    |                         |         |      |                  |
| 1405         | 10.40                 | ~0.25                                 | pump + surge screen from bottom    |                         |         |      |                  |
| 1415         | 11.33                 | "                                     | ~5                                 | 647                     | 18.5    | 6.42 | very turbid      |
| 1425         | 12.10                 | "                                     | pump + surge screen from midscreen |                         |         |      |                  |
| 1435         | 12.78                 | "                                     | ~10                                | 720                     | 18.3    | 6.58 | sl. less T       |
| 1445         | —                     | "                                     | pump + surge screen from bottom    |                         |         |      |                  |
| 1455         | 13.84                 | "                                     | ~15                                | 754                     | 18.5    | 6.58 | sl. less T.      |
| 1500         | —                     | pump off, allow recovery              |                                    |                         |         |      |                  |
| 8-28-02 1415 | 9.46                  | Ø                                     | pump on, no surging                |                         |         |      |                  |
| 1420         | 9.65                  | ~0.15                                 | ~16                                | 660                     | 18.7    | 6.55 | less turbid      |
| 1430         | 10.05                 | "                                     | ~17.5                              | 650                     | 18.8    | 6.53 | 59 NTU           |
| 1440         | 10.43                 | "                                     | ~19                                | 641                     | 18.7    | 6.52 | 38 NTU           |
| 1445         | 10.52                 | "                                     | ~20                                | 638                     | 18.7    | 6.50 | 26 NTU           |
| 1450         | —                     | pump off, development complete        |                                    |                         |         |      |                  |
|              |                       |                                       |                                    |                         |         |      |                  |
|              |                       |                                       |                                    |                         |         |      |                  |
|              |                       |                                       |                                    |                         |         |      |                  |
|              |                       |                                       |                                    |                         |         |      |                  |
|              |                       |                                       |                                    |                         |         |      |                  |

Comments:

| Taylor Lumber                          |  | Well Development Data                 |  | 169241.FI.Ø1                           |  |  |  |
|--|--|---------------------------------------|--|--|--|--|--|
| Well Number <u>MW 21s</u>              |  | Date Development Began <u>8-28-02</u> |  | Date Development Ended <u>8-29-02</u>  |  |  |  |
| Borehole Diameter _____                |  | Total Hours <u>2:15</u>               |  | Personnel <u>B. Collan</u>             |  |  |  |
| Total Well Depth <u>27.40'</u>         |  | Screen Interval _____                 |  | Method <u>Peristaltic pump + surge</u> |  |  |  |
| Depth to Water (Initial) <u>10.54'</u> |  |                                       |  |  |  |  |  |
| Depth to Water (Final) _____           |  |                                       |  |  |  |  |  |

| Time      | Depth to Water (fbs) | Discharge Rate (gpm)                | Cumulative Gallons                   | EC Micromhos /cm @ 25°C | TEMP °C | pH   | Appearance          |
|-----------|----------------------|-------------------------------------|--------------------------------------|-------------------------|---------|------|---------------------|
| 1350      | 10.54'               | Ø                                   | Surge entire screened area —         |                         |         |      |                     |
| 1400      | 10.54                | ~0.1                                | pump on, Q vs drawdown, pump + surge |                         |         |      |                     |
| 1402      | 12.02                | "                                   | ~0.2                                 | 1018                    | 16.2    | 7.38 | very turbid         |
| 1405      | 11.95                | increase Q to 1.8 gpm, pump + surge |                                      |                         |         |      |                     |
| 1410      | 12.20                | ~1.8                                | pump + surge from bottom             |                         |         |      |                     |
| 1420      | 12.04                | "                                   | pump + surge from mid screen         |                         |         |      |                     |
| 1430      | 12.19                | "                                   | pump + surge from top of water       |                         |         |      |                     |
| 1440      | 12.30                | "                                   | pump + surge from bottom             |                         |         |      |                     |
| 1450      | 12.29                | "                                   | pump + surge from mid screen         |                         |         |      |                     |
| 1500      | 12.20                | "                                   | ~95                                  | 1212                    | 13.3    | 7.75 | less Turbid         |
| 1500      | 12.20                | "                                   | No more surging —                    |                         |         |      |                     |
| 1515      | 12.19                | "                                   | ~120                                 | 1230                    | 13.3    | 7.78 | sl. less T. 397 Ntu |
| 1520      | 12.18                | Reduce Q to 0.8 gpm                 |                                      |                         |         |      |                     |
| 1525      | 11.80                | 0.8                                 | ~124                                 | 1217                    | 13.6    | 7.54 | sl. less T. 358 Ntu |
| 1545      | 11.59                | 0.8                                 | ~140                                 | 1249                    | 13.8    | 7.38 | 320 Ntu pump off    |
| 1610      | 10.55                | 0.3                                 | ~141                                 | 1255                    | 13.9    | 7.41 | 50 Ntu              |
| 1620      | 10.64                | "                                   | ~144                                 | 1261                    | 13.7    | 7.45 | 25 Ntu              |
| 1630      | 10.66                | "                                   | ~147                                 | 1265                    | 13.6    | 7.47 | 8 Ntu pump of       |
| Comments: |                      |                                     |                                      |                         |         |      |                     |

Taylor Lumber

## Well Development Data

169241.FI.01

Well Number MW225

Borehole Diameter

Total Well Depth 17.30'

Screen Interval

Depth to Water (Initial) 8.73'

Depth to Water (Final)

Date Development Began 8-28-02Date Development Ended 8-28-02Total Hours 1:40Personnel B. Collins

Method

Peristaltic pump + surge

| Time | Depth to Water (fbs) | Discharge Rate (gpm)   | Cumulative Gallons         | EC Micromhos /cm @ 25°C | TEMP °C | pH   | NTU/<br>Appearance |
|------|----------------------|------------------------|----------------------------|-------------------------|---------|------|--------------------|
| 1105 | 8.73                 | Ø                      | Surge entire screened area |                         |         |      |                    |
| 1114 | 8.73                 | ~0.2                   | pump on, drawdown vs Q     |                         |         |      | pump + surge       |
| 1116 | 9.19                 | "                      | ~0.4                       | 396                     | 12.8    | 7.75 | V. turbid          |
| 1135 | 9.66                 | increase Q to ~0.6 gpm |                            |                         |         |      | pump + surge       |
| 1145 | 10.05                | increase Q to ~0.9 gpm |                            |                         |         |      | pump + surge       |
| 1200 | 10.27                | increase Q to ~1.2 gpm |                            |                         |         |      | pump + surge       |
| 1215 | 10.80                | ~1.2                   | pump + surge from bottom   |                         |         |      |                    |
| 1220 | 10.93                | "                      | ~50                        | 337                     | 11.4    | 7.00 | less turbid        |
| 1230 | 10.99                | "                      | ~62                        | 336                     | 11.3    | 7.00 | sl. less T         |
| 1235 | 11.02                | "                      | ~69                        | 336                     | 11.3    | 7.00 | less T 81 Ntu      |
| 1240 | 11.04                | "                      | ~75                        | 336                     | 11.3    | 7.00 | 31 Ntu             |
| 1245 | —                    | 0.6                    | ~78 Reduce Q to ~0.6 gpm   |                         |         |      |                    |
| 1245 | 10.19                | "                      | ~78                        | 336                     | 11.9    | 7.02 | 29 Ntu             |
| 1255 | 10.09                | "                      | ~84                        | 335                     | 11.8    | 7.05 | 241 Ntu            |
| 1257 | —                    | —                      | pump off                   |                         |         |      |                    |
|      |                      |                        |                            |                         |         |      |                    |
|      |                      |                        |                            |                         |         |      |                    |
|      |                      |                        |                            |                         |         |      |                    |
|      |                      |                        |                            |                         |         |      |                    |

Comments:

Taylor Lumber

## Well Development Data

169241. FI. Ø1

Well Number MW235Date Development Began 8-28-02

Borehole Diameter \_\_\_\_\_

Date Development Ended 8-28-02Total Well Depth 18.05Total Hours 1:30

Screen Interval \_\_\_\_\_

Personnel B. ColtonDepth to Water (Initial) 9.19

Method \_\_\_\_\_

Depth to Water (Final) \_\_\_\_\_

Peristaltic pump + surge

| Time | Depth to Water (ftgs) | Discharge Rate (gpm)  | Cumulative Gallons             | EC Micromhos /cm @ 25°C | TEMP °C | pH   | NTU/<br>Appearance       |
|------|-----------------------|-----------------------|--------------------------------|-------------------------|---------|------|--------------------------|
| 0905 | 9.19                  | Ø                     | Surge entire screened area     |                         |         |      |                          |
| 0915 | 9.19                  | —                     | pump on, drawdown vs Q         |                         |         |      | pump + surge             |
| 0915 | 9.43                  | ~0.2                  | ~4                             | 1388                    | 15.9    | 7.56 | Very Turbid              |
| 0925 | 9.52                  | increase Q to 0.25    |                                |                         |         |      | pump + surge screen      |
| 0935 | 09.50                 | increase Q to 0.6     |                                |                         |         |      | pump + surge from bottom |
| 0945 | 9.63                  | increase Q to 0.9     |                                |                         |         |      | pump + surge from middle |
| 0955 | 9.81                  | increase Q to 1.2 gpm |                                |                         |         |      | pump + surge from bottom |
| 1005 | 10.09                 | ~1.2                  | ~32                            | 1817                    | 12.1    | 7.02 | less T.                  |
| 1015 | 10.08                 | "                     | pump + surge from top of water |                         |         |      |                          |
| 1020 | 10.10                 | "                     | No more surging                |                         |         |      |                          |
| 1025 | 10.08                 | "                     | ~56                            | 1838                    | 12.0    | 7.00 | much less T.             |
| 1030 | 10.08                 | "                     | ~60                            | 1865                    | 12.1    | 7.00 | 49 NTU                   |
| 1035 | 10.08                 | reduce Q to ~0.6      |                                |                         |         |      | allow to clean up        |
| 1040 | 9.70                  | 0.6                   | ~62                            | 1886                    | 12.4    | 6.99 | 4.3 NTU                  |
| 1045 | 9.66                  | "                     | ~65                            | 1873                    | 12.4    | 6.98 | 2.6 NTU                  |
| 1047 | —                     | —                     | pump off                       |                         |         |      |                          |
|      |                       |                       |                                |                         |         |      |                          |
|      |                       |                       |                                |                         |         |      |                          |
|      |                       |                       |                                |                         |         |      |                          |

Comments:

Taylor Lumber

## Well Development Data

169241. F.I. 81

Well Number WW101s  
 Borehole Diameter \_\_\_\_\_  
 Total Well Depth 19.40'  
 Screen Interval \_\_\_\_\_  
 Depth to Water (Initial) 4.11'  
 Depth to Water (Final) \_\_\_\_\_

Date Development Began 8-29-02  
 Date Development Ended 8-29-02  
 Total Hours \_\_\_\_\_  
 Personnel B. Cotton  
 Method \_\_\_\_\_

Peristaltic pump + surge

| Time | Depth to Water (ftgs) | Discharge Rate (gpm) | Cumulative Gallons                    | EC Micromhos /cm @ 25°C | TEMP °C | pH   | Appearance              |
|------|-----------------------|----------------------|---------------------------------------|-------------------------|---------|------|-------------------------|
| 1140 | 4.11                  | Ø                    | Surge entire screened interval        |                         |         |      |                         |
| 1145 | 4.11                  | ~0.2                 | pump on, pump + surge, Q vs. drawdown |                         |         |      |                         |
| 1150 | 5.80                  | ~0.6                 | ~3                                    | 1459                    | 17.0    | 7.16 | sl. turbid. immulsion   |
| 1155 | 6.75                  | "                    | pump + surge from bottom              |                         |         |      | oil immulsion in bucket |
| 1205 | 7.05                  | "                    | pump + surge from midscreen           |                         |         |      | NAPL                    |
| 1215 | 8.50                  | "                    | " "                                   | "                       |         |      | top of water            |
| 1225 | 8.58                  | "                    | " "                                   | "                       |         |      | bottom - immulsion!     |
| 1245 | 8.69                  | "                    | ~39                                   | 1480                    | 17.3    | 7.41 | NAPL                    |
| 1310 | 8.70                  | "                    | pump + surge from midscreen           |                         |         |      | NAPL                    |
| 1330 | 8.80                  | "                    | ~66                                   | 1470                    | 17.4    | 7.50 | NAPL                    |
| 1350 | 8.85                  | "                    | pump + surge from bottom              |                         |         |      | NAPL decreasing         |
| 1400 | 9.10                  | 0.8                  | increase Q to 0.8, pump + surge       |                         |         |      | ~4 gal.                 |
| 1410 | 9.15                  | 0.8                  | ~92                                   | 1485                    | 17.4    | 7.60 | NAPL - less turbid      |
| 1415 | 8.80                  | 0.8                  | ~95                                   | 1487                    | 17.5    | 7.61 | sl. less turbid 40 NTU  |
| 1420 | 8.77                  | "                    | ~98                                   | 1489                    | 17.5    | 7.65 | 30 NTU                  |
| 1425 | 8.74                  | "                    | ~101                                  | 1490                    | 17.6    | 7.66 | 18 NTU                  |
| 1430 | 8.71                  | "                    | ~104                                  | 1490                    | 17.6    | 7.68 | 15 NTU                  |
|      |                       | pump off             |                                       |                         |         |      |                         |

Comments: No DNAPL detected, immulsion of NAPL + water pumping thru, even tho pumping from bottom, it floats tho is somewhat aerated. NAPL is very smelly + stains everything! When pumping from top, no immulsion but sheen persists + staining too.



Appendix D  
QAPPs Validation Reports

Appendix D-1  
Groundwater Monitoring Quality  
Assurance Plan

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*Plan*

# **Groundwater Monitoring Quality Assurance Project Plan**

**Taylor Lumber and Treating  
Superfund Site**

Prepared for  
**U.S. Environmental Protection Agency**

**WA No. 125-RICO-10FI  
RAC V Contract No. 68-W6-0025**

January 2002

**CH2MHILL**

**TAYLOR LUMBER AND TREATING SITE GROUNDWATER  
MONITORING QUALITY ASSURANCE PROJECT PLAN (QAPP)**

**APPROVED:**

\_\_\_\_\_  
Project Chemist

\_\_\_\_\_  
Date

\_\_\_\_\_  
Project Manager

\_\_\_\_\_  
Date

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# 1.0 Project Management

## 1.1 Project Organization

The names and responsibilities of key project personnel that will be involved in groundwater monitoring at Taylor Lumber and Treating Superfund Site (TLT) are listed below in Table 1-1.

**TABLE 1-1**  
Project Personnel  
*Taylor Lumber and Treating*

| Title   | Responsibility  | Name   | Phone   |
|---|---|--|---|
| EPA Project Manager                           | Coordinates all of the project efforts. Interfaces directly with the CH2M HILL Project Manager  | Loren McPhillips/EPA   | 206-553-4903                                    |
| CH2M HILL Project Manager/ Project QA Manager | Responsible for the coordination and execution of all work items associated with project planning and implementation. Liaison between program-level managers and project-level team members. Identifies team members and project assignments. Manages and tracks schedule and budget. Ensures that all tasks are completed by assigned team members within schedule and budget constraints. | Robin Strauss/CH2M HILL<br>2300 NW Walnut Blvd.<br>Corvallis, OR 97330<br><a href="mailto:Rstrauss@ch2m.com">Rstrauss@ch2m.com</a> | 542-758-0235<br>ext. 3520                       |
| EPA Chemist/Data Validation                   | Responsible for coordinating analytical services with Manchester Laboratory. Coordinates sample shipments to Manchester laboratory, monitors lab TAT. Reviews and validates data and generates data validation summary report.  | Laura Castrilli/EPA<br><a href="mailto:Castrilli.laura@epa.org">Castrilli.laura@epa.org</a>  | 206-553-4323<br>fax (206)-553-8210              |
| CH2M HILL Data Manager                        | Responsible for the preparing chain of custody's, sample bottle labels. Utilizes project database to produce data summary reports under direction of the project manager.   | Trish Larson/CH2M HILL<br>2300 NW Walnut Blvd.<br>Corvallis, OR 97330<br><a href="mailto:Plarson@ch2m.com">Plarson@ch2m.com</a>    | (541) 758-0235<br>ext. 3512                     |
| CH2M HILL Project Chemist                     | Coordinates chemistry issues for CH2M HILL. Interact with EPA Chemist on QAPP; sample bottle prep and data validation issues. Prepares QAPP, point of contact for non-CLP laboratories.   | Scott Echols/CH2M HILL<br>2300 NW Walnut Blvd.<br>Corvallis, OR 97330<br><a href="mailto:Sechols@ch2m.com">Sechols@ch2m.com</a>    | 541-758-0235<br>ext. 3148                       |
| Field Team Leader and Site Safety Coordinator | Oversees field activities and implements the FSP. As SSC will implement the Health and Safety Plan in the field.  | Barry Collom/CH2M HILL<br>2300 NW Walnut Blvd.<br>Corvallis, OR 97330<br><a href="mailto:Bcollom@ch2m.com">Bcollom@ch2m.com</a>    | 541-758-0235<br>ext. 3687<br>Cell: 541-740-3250 |
| Lab Project Manager – Triangle Labs           | Will serve as the laboratory contact and communicate through the CH2M HILL project chemist to coordinate sample bottle delivery, field sample delivery schedule and data delivery schedules.  | Norm Hoffa<br>Triangle Labs<br>2445 S. Alston Ave.<br>Durham, NC 27713   | (919)-544-5729                                  |



## 1.2 Problem Definition and Background

### 1.2.1 Background

Taylor Lumber and Treating (TLT) Superfund Site is a lumber mill and wood treating facility located in northwest Oregon on the east slope of the coast range. TLT has been the subject of over a dozen environmental inspections, investigations and actions, and a number of reports and data sets have been generated for the site. Most recently, the *Integrated Assessment* (IA) (E&E, 1999) was completed, collecting samples from all media to assess the site contamination for subsequent removal activities.

Several remedial activities were conducted as a result of the 1999 investigation and reported in the *Removal Action Report* (RA) (E&E, 2001). These included the installation of a bentonite barrier wall to contain the DNAPL plume beneath the treatment area. The wall was keyed into the underlying siltstone, the surface inside the barrier wall was paved, and a groundwater extraction system was constructed within the contained area. In addition, a portion of the Treated Pole Storage area was capped to prevent exposure to arsenic contaminated soil. Finally, areas of onsite ditches known to contain high levels of arsenic were excavated.

The *Phase 1 RI Report* (CH2M HILL, December 2001) summarizes the knowledge gained from the previous investigations and presents the data from the IA and the RA. This data was compared against risk based screening values to determine which contaminants will most likely be found to drive the risk, whether there are any data gaps that need to be filled before conducting the baseline risk assessment, and whether there are any interim actions required.

### 1.2.2 Problem Statement

Shallow groundwater beneath the treatment plant area has been contaminated by wood treating chemicals: creosote, pentachlorophenol (PCP), chemonite (ammoniacal copper zinc arsenate or ACZA), and CCA (chromium copper arsenate). Contaminants were leached into the groundwater from the former drip pad and several tank farm spills. DNAPL has been observed directly below the treatment facility, perched over the siltstone, and concentrations of many of the contaminants exceed 100x the respective PRGs. The primary contaminants of concern at the site are dioxins/furans, PAHs, PCP and related compounds, arsenic, copper, and chromium.

A grout curtain was installed around the treatment area to contain the DNAPL and prevent the most contaminated groundwater from migrating beyond the property boundaries. Numerous wells have been installed over the past decade to monitor the contamination. Currently, eighteen wells are present outside the barrier wall and 14 are inside. A number of groundwater samples were collected from these wells before the barrier wall was installed (the most recent sampling event was in 1999); however none have been collected since.

Groundwater monitoring and water level measurements are planned in order to determine the effectiveness of the barrier wall, contaminant concentrations outside the wall, and the potential risk that those contaminants will reach the South Yamhill River. Current groundwater data is also required for the baseline risk assessment (BLRA).

Groundwater data from the first quarterly event will be compared to the groundwater data set collected in 1999. If contaminant concentrations outside the barrier wall appear to be increasing or are similar to 1999 concentrations, additional wells and geoprobes will be necessary to characterize the groundwater between the barrier wall and the river. These wells will be installed before the second groundwater-monitoring event.

If contaminant concentrations appear to be lower than 1999 concentrations, additional wells may be unnecessary. A second quarterly event will be conducted to confirm results from the first quarter.

### 1.2.3 Objectives and Data Needs

Groundwater monitoring will be conducted at TLT to answer the following questions:

- Is the barrier wall effectively containing DNAPL and contaminated groundwater beneath the treatment plant area?
- Are concentrations inside the barrier wall decreasing?
- Are existing wells sufficient for risk decisions?
- Do contaminant concentrations pose a risk to human health or ecosystems? .

To answer these questions, the following data will be collected during the first quarterly groundwater-monitoring event:

- Thickness of DNAPL inside barrier wall, and confirm its absence outside the wall.

The barrier wall does not key into the siltstone for approximately 25 feet at the southeast corner due to a depression in the siltstone. If there is any evidence that DNAPL is not completely contained within the barrier wall, a monitor well, screened across the upper surface of the siltstone, will be installed immediately down gradient of this gap, to monitor for migrating DNAPL.

- Monthly groundwater levels both inside and outside the barrier wall.

This data will be used to construct seasonal groundwater flow maps for the shallow and deep water bearing zones, and help to determine the effect of the barrier wall on groundwater flow, as well as the potential need and placement of additional monitor wells.

- Groundwater quality data from existing wells.

Data will be used in the BLRA, and to compare with previous data sets. Declining concentrations suggest that the barrier wall is effective, and if confirmed during the next sampling event, additional wells will not be needed. If concentrations are stable or appear to be increasing, several wells will be installed at locations to be determined.

## 1.3 Project Task Description and Schedule

The primary tasks of the groundwater monitoring well sampling program at TLT include:

- Water levels from all onsite wells will be measured monthly beginning in February 2002.

- During quarterly sampling events beginning in February 2002:
  - DNAPL thickness will be measured at all wells.
  - Groundwater samples will be obtained from the 18 wells outside the barrier wall
  - Groundwater samples will be obtained from two wells inside the barrier wall
  - Groundwater samples will be collected from at least two nearby residential wells
  - Effluent from the groundwater extraction system will be collected

Table 1-2 lists all wells and indicates from which wells groundwater will be collected. Groundwater samples and effluent will be analyzed for the target compounds listed in Table 1-3. These tables are presented at the end of this section.

### 1.3.1 Applicable Technical Quality Standards

The analytical methods and required reporting limit for each analyte is given in Table 1-3. The reporting limits are based on the Tap Water PRG requirements.

### 1.3.2 Project Quality Assessment Techniques

Quality assessments will be performed during the execution of this project in the order they are listed in Table 1-4.

**TABLE 1-4**  
Quality Assessments  
*Taylor Lumber and Treating*

| Assessment Need                  | Purpose  | Performed By                     |
|----------------------------------|--|----------------------------------|
| Review of QAPP                   | Confirm that the proposed sampling and analysis plan meets DQO needs | CH2M HILL PM and EPA Chemist     |
| Review of Lab Data               | Bench/Lab level review to ensure data meets method requirements      | Analytical Laboratory            |
| Review of field data/boring logs | Verifies correct samples taken, procedures followed by field team    | CH2M HILL PM                     |
| E-data/Hardcopy Data Review      | Verifies e-data and hardcopy data match                              | EPA Chemist/CH2M HILL Chemist    |
| Data Validation                  | Determines whether data meets QA/QC requirements; assesses usability | EPA Chemist or CH2M HILL Chemist |
| Reconciliation with DQO's        | Determines whether data meets DQO's for project                      | CH2M HILL Project Team           |

### 1.3.3 Anticipated Work Schedule

A tentative schedule for the first quarter sample collection, lab analyses and data review is shown in Table 1-5. The second quarter groundwater monitoring will be conducted three months after the first, or approximately the first week in May.

**TABLE 1-5**  
Anticipated Work Schedule  
*Taylor Lumber and Treating*

| Tasks   | Interval to Complete                        | Tentative Schedule         |
|---|---|----------------------------|
| QAPP completed and sent to EPA                                    |   | January 11                 |
| EPA reviews QAPP  | 2 weeks                                     | January 11 to January 25   |
| QAPP approved   |   | January 25                 |
| Conduct first quarter monitoring                                  | 1 week                                      | February 11 to February 15 |
| Lab sample receipt complete                                       |   | February 18                |
| Conduct lab analyses  | 3 weeks (up to 6 weeks for metals analysis) | Feb 18 to March 11         |
| Hard copy and e-data sent to EPA or CH2M HILL                     |   | March 11                   |
| Data reviewed and validated                                       | 2 weeks                                     | March 11 to March 25       |
| Validated data sent to CH2M HILL project chemist and data manager |   | March 25                   |
| Data loaded into database   | 3 days                                      | March 25 to March 28       |
| Data ready for project use  |   | March 28                   |

## 1.4 Quality Objectives and Criteria for Measurement Data

This subsection defines the levels of data quality that will be required for Taylor Lumber and Treating Remedial Investigation. This subsection also provides the quantitative quality objectives and measurement performance criteria for the analytical data.

### 1.4.1 Data Quality Objectives (DQOs)

Data quality objectives (DQOs) are both qualitative and quantitative statements that define the type, quality, and quantity of data necessary to support project decisions. The intended final use of the groundwater monitoring data will include risk evaluation and decision-making for potential interim actions and for the feasibility study. DQOs for the groundwater monitoring are summarized in Section 1.2. A discussion of the development of the project-specific DQOs is presented in the Taylor Lumber and Treating Field Groundwater Sampling Plan (FSP).

### 1.4.2 Method Performance Objectives

The sampling approach and rationale are based on the DQOs. A primary objective for the groundwater monitoring is to provide current analytical data for a BLRA. In order to present an optimal data set for this purpose, the detection/quantification limits for each parameter must be lower than the comparison values that will be used in the BLRA. For groundwater, these comparison values will be the Tap water PRGs. The target analyte list and required reporting limits are listed in Table 1-3.

### 1.4.3 Levels of Data Quality

Two categories of data will be collected as part of this field effort, and each category has a different level of supporting QA/QC documentation. Measurements requiring U.S. EPA Level 1 QA/QC documentation include field-monitoring activities such as the measurement of organic vapor (OVM), dissolved oxygen, pH, redox potential, specific conductivity, and turbidity. Samples submitted to the laboratory for analysis will require U.S. EPA Level 3 QA/QC documentation. For each QC level, the measures and methods to be used, as well as the applicable data package deliverables, are outlined below.

#### Level 1-Field Survey Data

Field-monitoring activities do not require formal data package deliverables. Water quality parameters to be measured in the field consist of temperature, pH, specific conductance, dissolved oxygen, turbidity, oxidation-reduction potential (ORP), and water levels. Organic Vapor (OVM) response levels for site safety and screening use will be a Level 1 field activity.

Monitoring results, as well as pertinent data concerning the sampling event, will be documented in the bound field notebook. Level 1 documentation will consist of the following:

- Location/depth readings from wells
- Instrument identification
- Calibration information (standards used and results)
- Date and time of calibration and sample measurements
- Sample results

The logbooks will be reviewed by the FTL for completeness and correctness. No additional documentation or data quality evaluation is required.

#### Level 3-Laboratory Analysis

Laboratory analysis of samples for the analytes listed in Table 1-5 requires a Level 3 data package containing sample results and summaries of all the QA/QC data. The data package will include the information, but not necessarily in the exact format, requested in all the forms listed in the CLP SOW OLC03.2, ILM04.1 or DLM01.2, as appropriate.

### 1.4.4 Quality of Data

Analytical performance requirements are expressed in terms of precision, accuracy, representativeness, comparability, completeness, and sensitivity (PARCCS). Summarized below are definitions for each PARCCS parameter.

Table 1-6 summarizes the level of accuracy required for each field parameter, and Table 1-7 summarizes the accuracy required for the laboratory samples.

### Precision

Precision is the measure of the scatter of a group of measurements, made under identical conditions, about their mean value. The overall precision of the measurement system is a combination of sampling precision and analytical precision. Sampling, or field duplicate precision, can be assessed by collecting and analyzing duplicate field samples. Analytical (laboratory) precision is derived from the analysis of a duplicate created in the laboratory from one or more of the investigative samples. Sampling precision is defined as the combination of sampling and analytical precision and is represented by the difference between field duplicate measurements. Precision is typically measured by analyzing field duplicate and laboratory duplicate samples (sample duplicate, matrix spike duplicate, check standard duplicate, and/or laboratory blank duplicate). Precision is most frequently expressed as standard deviation (s), percent relative standard deviation (%RSD), coefficient of variation (CV), or relative percent difference (RPD). The numeric QC limits for precision are shown in Table 1-7. Field duplicate samples will be collected at a frequency of 1 in 10 samples. The precision of a duplicate determination can be expressed as the relative percent difference (RPD), as calculated as

$$RPD = \left\{ (|X_1 - X_2|) / (X_1 + X_2) / 2 \right\} \times 100 = \left\{ \frac{|X_1 - X_2|}{\frac{(X_1 + X_2)}{2}} \right\} \times 100$$

$X_1$  = native sample  
 $X_2$  = duplicate sample

### Accuracy

Accuracy is the measure of agreement between an analytical result (or the mean of several results) and its true or accepted value. Deviations from a standard value represent the cumulative errors in the measurement system. Potential sources of error include (but are not limited to) sample collection, sample preservation, sample handling, matrix effects, sample analysis, and data reduction. Sampling and field sample handling accuracy is normally assessed by collecting field blanks and analyzing them for the parameters of interest. A field blank should report no targeted parameter at a concentration greater than the practical quantitation limit (PQL) or minimum reporting limit (MRL). If these limits are exceeded, the source of contamination will be investigated and corrective action taken. Analytical laboratory accuracy is determined by comparing results from the analysis of matrix spikes, surrogates, or check standard samples to the known values. Accuracy, defined as percent recovery (P), is calculated as

$$P = \left[ \frac{(SSR - SR)}{SA} \right] \times 100$$

SSR=spiked sample result, SR=sample result (native), and SA=the spike concentration added to the spiked sample

Numeric QC limit objectives for accuracy are shown in Table 1-7. For some compounds (in particular the phenolics) these criteria may be difficult to achieve; however, in such cases the data still must meet method and laboratory internal limits for quality control criteria.

### **Representativeness**

Representativeness is a qualitative measure of the degree to which sample data accurately and precisely represent a characteristic environmental condition. Representativeness is a subjective parameter and is used to evaluate the efficacy of the sampling plan design. Representativeness is demonstrated by providing full descriptions of the sampling techniques and the rationale used for selecting sampling locations in the project planning documents.

Representativeness is a qualitative parameter that will be controlled by the proper design and management of the sampling Project. Good representativeness will be achieved through:

- Careful, informed selection of sampling sites,
- Selection of testing parameters and methods that adequately define and characterize the groundwater samples,
- Proper gathering and handling of samples so as to avoid interferences and prevent contamination and loss, and
- Collection of a sufficient number of samples to allow a statistically valid monitoring project.

### **Completeness**

Completeness is defined as the percentage of measurements that are judged to be valid compared to the total number of measurements made for a specific sample matrix and analysis. Completeness is calculated using the following formula:

$$\text{Completeness} = \frac{\text{Valid Measurements}}{\text{Total Measurements}} \times 100$$

Completeness is defined as the percentage of measurements that are judged to be valid measurements. Factors that negatively affect completeness include the following:

- Missing scheduled sampling events
- Submitting improper quantity of sample
- Sample leakage or breakage in transit or during handling
- Exceeding holding times
- Losing sample during laboratory analysis through accident or improper handling
- Improper documentation such that traceability is compromised
- Reported field and analytical data that is of insufficient sensitivity

The completeness requirement is based on the number of samples required by the sampling plan. A completeness objective of at least 90 percent of the data specified by the FSP is the goal established for this Project.

## Comparability

Comparability is another qualitative measure designed to express the confidence with which one data set may be compared to another. Sample collection and handling techniques, sample matrix type, and analytical method all affect comparability.

Comparability is limited by the other PARCCS parameters because data sets can be compared with confidence only when precision and accuracy are known. Data from one phase of an investigation can be compared to others when similar methods are used and similar data packages are obtained.

## Sensitivity

Sensitivity is the measure of the concentration at which an analytical method can positively identify and report analytical results. The sensitivity of a given method is commonly referred to as the detection limit. Although there is no single definition of this term, the following terms commonly used to measure sensitivity are defined below.

- **Instrument detection limit (IDL)** is the minimum concentration that can be measured from instrument background noise and is normally only measured for metals parameters.
- **Method detection limit (MDL)** is a statistically determined concentration. It is the minimum concentration of an analyte that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero as determined in the same or a similar matrix. Because of the lack of information on analytical precision at this level, sample results greater than the MDL but less than the PQL will be laboratory qualified as "estimated."
- **Practical quantification limit (PQL)** is the sample volume or dry weight adjusted concentration of the target analyte that the laboratory has demonstrated the ability to measure within specified limits of precision and accuracy during routine laboratory operating conditions. This value is variable and highly matrix dependent. It is the minimum concentration that will be reported as "unqualified" by the laboratory. For organics analysis and inorganic ions this corresponds to the lowest calibration standard used.

## 1.5 Special Training Requirements and Certifications

Field personnel are enrolled in the CH2M HILL Comprehensive Health and Safety Program and meet state and federal hazardous waste operations requirements for 40-hour initial training, 3-day on-the-job experience, and 8-hour annual refresher training. Employees designated "SSC" have completed a 12-hour site safety coordinator course, and have documented requisite field experience. An SSC with a level designation (D, C, B) equal to or greater than the level of protection being used must be present during all tasks performed in exclusion or decontamination zones.



## 1.6 Documentation and Records

This section defines which records are critical to the project and what information needs to be included in reports, as well as the data reporting format and the document control procedures to be used.

Project activities must be properly documented and those records stored and maintained. The CH2M HILL PM will be responsible for organizing, storing, and cataloging all project information. Individual project team members may maintain separate notebooks for individual tasks and these notebooks will be transferred to the PM at the end of the project during project closeout.

### 1.6.1 Field Operation Records

The information contained in these records documents overall field operations and generally consist of the following:

**Sample collection records.** Field personnel will use a project notebook to record all pertinent information and to describe sampling procedures. After completion of the sampling activities, the field notebooks will be in the custody of the PM. Each notebook will be identified by the project-specific document number, and each page will be numbered. Personnel will update the project notebooks daily during field activities. At a minimum, this documentation should include:

- the names of the persons conducting the activity,
- subcontractor personnel,
- time of arrival and departure at the site,
- health and safety monitoring records
- sample number and sample collection points,
- maps and diagrams,
- equipment methods used,
- climatic conditions,
- and any unusual observations.

All original data recorded in field logbooks, sample labels, and COC forms will be written with waterproof, indelible ink. If an error is the individual should make all corrections simply by crossing a line through the error, initialing and dating the correction, and entering the correct information.

**Chain-of-custody records.** Chain-of –custody (COC) records document the progression of samples as they travel from the original sampling location to the laboratory.

**QC sample records.** These records document the generation for QC samples, such as field, trip, and equipment rinsate blanks and duplicate samples. They also include documentation on sample integrity and preservation and include calibration and standards' traceability documentation capable of providing a reproducible reference point. QC sample records should contain information on the frequency, conditions, level of standards, and instrument calibration history.

**Corrective action reports.** Corrective action reports show what methods were used in cases where general field practices or other standard procedures were deviated from and include the methods used to resolve noncompliance.

### 1.6.2 Laboratory Records

In general, data report packages from the laboratory must contain the same documentation controls and be in a similar format as to those required for CLP organics and inorganic work. The following list describes some of the laboratory-specific records that should be compiled if available and appropriate:

**Sample Data.** These records contain the times that samples were analyzed to verify that they met the holding times prescribed in the analytical methods. Included should be the overall number of samples, sample location information, any deviations from the SOPs, time of day, and date. Corrective action procedures to replace samples violating the protocol also should be noted.

**Sample Management Records.** Sample management records document sample receipt, handling and storage, and scheduling of analyses. The records verify that the chain-of-custody and proper preservation were maintained, reflect any anomalies in the samples (such as receipt of damaged samples), note proper log-in of samples into the laboratory, and address procedures used to ensure that holding time requirements were met.

**Test Methods.** Unless analyses are performed exactly as prescribed by SOPs, this documentation will describe how the analyses were carried out in the laboratory. This includes sample preparation and analysis, instrument standardization, detection and reporting limits, and test-specific QC criteria. Documentation demonstrating laboratory proficiency with each method used could be included.

**QA/QC Reports.** These reports will include the general QC records, such as initial demonstration of capability, instrument calibration, routine monitoring of analytical performance, calibration verification, etc. Project-specific information from the QA/QC checks such as blanks (field, reagent, rinsate, and method), spikes (matrix, matrix spike replicate, analysis matrix spike, and surrogate spike), calibration check samples (zero check, span check, and mid-range check), replicates, splits, and so on should be included in these reports to facilitate data quality analysis.

### 1.6.3 Data Handling Records

Data handling records document protocols used in data reduction, verification, and validation. Data reduction addresses data transformation operations such as converting raw data into reportable quantities and units, use of significant figures, recording of extreme values, blank corrections, etc. Data verification ensures the accuracy of data transcription and calculations, if necessary, by checking a set of computer calculations manually. Data validation ensures that QC criteria have been met.

### 1.6.4 Data Reporting Package Format and Documentation Control

The format of all data reporting packages must be consistent with the requirements and procedures used for data validation and data assessment described in Section 7 of this document. All individual records that represent action taken to achieve the objective of the

data operation and the performance of specific QA functions are potential components of the final data reporting package.

**TABLE 1-2**  
Well Summary  
*Taylor Lumber and Treating*

| Well Number | Date Installed | Facility Area      | Northing | Easting  | TOC Elevation (ft amsl) | Surface Elevation (ft amsl) | Depth of Casing (ft bgs) | Well Casing I.D. (in) | Screened Interval (ft bgs) |
|-------------|----------------|--------------------|----------|----------|-------------------------|-----------------------------|--------------------------|-----------------------|----------------------------|
| MW-1S       | 1/12/87        | Treated Pole Sto.  | 8469     | 9926     | 207.61                  | 207.20                      | 15.0                     | 2                     | 9.5-14.5                   |
| MW-2S       | 8/15/96        | Treatment Plant    | 8151     | 9584     | 208.48                  | 206.38                      | 17.2                     |                       | 9.2-17                     |
| MW-2D       | 1/15/87        | Treatment Plant    | 8146     | 9581     | 288.07                  | 206.30                      | 30.0                     | 2                     | 20.0-29.0                  |
| MW-4S       | 1/13/87        | Treatment Plant    | 8284     | 9385     | 210.71                  | NA                          | 16.0                     | 2                     | 11.0-16.0                  |
| MW-4D       | 1/15/87        | Treatment Plant    | 8282     | 9380     | 209.60                  | 208.24                      | 29.0                     | 2                     | 19.0-29.0                  |
| MW-6S       | 12/6/95        | Treatment Plant    | 8107     | 9896     | 204.68                  | NA                          | 11.9                     | 2                     | 6.5-11.4                   |
| MW-6D       | 12/6/95        | Treatment Plant    | 8099     | 9896     | 204.78                  | NA                          | 29.2                     | 2                     | 19.9-29.2                  |
| MW-7S       | 8/16/96        | Truck Shop         | 9146.51  | 9118.34  | 212.72                  | 210.73                      | 19.5                     | 2                     | 13.3-18.1                  |
| MW-7D       | 8/22/96        | Truck Shop         | 9146.51  | 9118.34  | 213.08                  | 210.90                      | 32.0                     | 2                     | 22.1-32.0                  |
| MW-8D       | 2/11/97        | Treatment Plant    | 8274.02  | 9679.87  | 206.89                  | 207.12                      | 31.4                     | 2                     | 21.0-31.0                  |
| MW-9S       | 12/16/96       | South of Hwy 18B   | 7664.10  | 10036.20 | 205.78                  | 204.45                      | 14.3                     | 2                     | 6.3-13.3                   |
| MW-10S      | 12/16/96       | South of Hwy 18B   | 7817.90  | 9487.60  | 203.17                  | 201.97                      | 10.5                     | 2                     | 4.5-9.5                    |
| MW-11S      | 12/16/96       | East of R.C. Rd.   | 8470.10  | 10002.10 | 207.27                  | 205.61                      | 17.5                     | 2                     | 6.5-16.5                   |
| MW-12S      | 1/14/00        | Treatment Plant    | 8102.70  | 9885.52  | 204.49                  | 204.80                      | 12.0                     | 6                     | 7.0-12.0                   |
| MW-13S      | 1/12/00        | Treatment Plant    | 8123.53  | 9873.90  | 204.92                  | 205.28                      | 14.0                     | 2                     | 9.0-14.0                   |
| MW-14S      | 1/12/00        | Treatment Plant    | 8095.17  | 9761.60  | 205.82                  | 206.13                      | 14.5                     | 2                     | 9.5-14.5                   |
| MW-15S      | 1/13/00        | Treatment Plant    | 7929.56  | 9703.49  | 204.65                  | 205.14                      | 12.5                     | 2                     | 7.5-12.5                   |
| MW-16S      | 1/13/00        | Treatment Plant    | 7997.25  | 9601.66  | 205.19                  | 205.62                      | 13.5                     | 2                     | 8.5-13.5                   |
| MW-101S     | 5/11/00        | Treatment Plant    | 8278.25  | 9582.63  | 206.81                  | 207.10                      | 18.5                     | 2                     | 8.0-18.0                   |
| MW-102S     | 5/10/00        | Treatment Plant    | 8181.72  | 9444.12  | 207.49                  | 207.80                      | 16.5                     | 2                     | 11.0-16.0                  |
| MW-103S     | 5/10/00        | Treatment Plant    | 7966.80  | 9473.93  | 207.62                  | 207.80                      | 16.0                     | 2                     | 10.5-15.5                  |
| MW-104S     | 5/10/00        | Treatment Plant    | 8047.75  | 9582.01  | 205.22                  | 205.40                      | 14.0                     | 2                     | 8.5-13.5                   |
| PZ-101      | 8/12/96        | Treatment Plant    | 8181.22  | 9173.31  | 208.48                  | 206.80                      | 13.5                     | 2                     | 7.0-13.0                   |
| PZ-102      | 8/9/96         | Treatment Plant    | 7812.79  | 9796.77  | 204.02                  | 204.93                      | 12.2                     | 2                     | 9.0-12.0                   |
| PZ-105      | 8/9/96         | Treatment Plant    | 7877.50  | 9571.88  | 205.94                  | 202.94                      | 12.0                     | 2                     | 7.7-11.7                   |
| PZ-116      | 8/12/96        | Treated Pole Sto.  |          |          |                         |                             | 21.0                     |                       | 9.5-19.5                   |
| N-1S        | 12/17/96       | Treatment Plant    | 8331.90  | 9508.07  | 209.89                  | 208.24                      | 10.8                     | 2                     | 4.8-9.8                    |
| N-1D        | 12/17/96       | Treatment Plant    | 8332.03  | 9511.22  | 209.90                  | 208.24                      | 17.4                     | 2                     | 11.4-16.4                  |
| N-2S        | 12/18/96       | Treatment Plant    | 8416.92  | 9575.33  | 207.27                  | 207.49                      | 10.2                     | 2                     | 4.0-9.0                    |
| N-2D        | 12/17/96       | Treatment Plant    | 8418.74  | 9578.94  | 207.03                  | 207.38                      | 16.6                     | 2                     | 11.0-16.0                  |
| N-3S        | 12/20/96       | Treatment Plant    | 8408.75  | 9757.45  | 207.83                  | 208.24                      | 9.0                      | 2                     | 3.8-7.2                    |
| N-3D        | 12/23/96       | Treatment Plant    | 8398.48  | 9750.59  | 207.74                  | 208.08                      | 18.2                     | 2                     | 10.0-17.0                  |
| RW-01       |                | Residential (West) |          |          |                         |                             | 30.0                     |                       |                            |
| RW-02       |                | Residential (East) |          |          |                         |                             |                          |                       |                            |

Highlighted wells will be sampled. With the exception of MW-101S and MW-104S, all are outside the barrier wall.

Italicized N/E are estimates

ft bgs = feet below ground surface

ft amsl = feet above mean sea level

TOC = Top of casing

**TABLE 1-3**

Analyte List, Required Reporting Limits, Lab Quantitation Limits and Lab Method Detection Limits  
Taylor Lumber and Treating

| Parameter                             | CAS            | Method              | Required Project Reporting Limit <sup>1</sup><br>µg/L | Lab Practical Quantitation Limit (PQL) | Lab Method Detection Limit (MDL) |
|---------------------------------------|----------------|---------------------|---|--|----------------------------------|
| <b>Metals</b>                         |                |                     |   |  |                                  |
| Aluminum                              | 7429-90-5      | EPA 200.7           | 36,500  | 100                                    | 20                               |
| Antimony                              | 7440-36-0      | EPA 200.7/200.8 (2) | 15  | 200/5                                  | 45/0.8                           |
| Arsenic                               | 7440-38-2      | EPA 200.7/200.8 (2) | 0.045   | 200/5                                  | 45/0.5                           |
| Barium                                | 7440-39-3      | EPA 200.7           | 2,600   | 5                                      | 0.5                              |
| Beryllium                             | 7440-41-7      | EPA 200.7           | 73  | 5                                      | 1                                |
| Cadmium                               | 7440-39-3      | EPA 200.7           | 18  | 10                                     | 2                                |
| Chromium, total                       | 7440-47-3      | EPA 200.7           | 110   | 20                                     | 5                                |
| Cobalt                                | 7440-48-4      | EPA 200.7           | 2,200   | 30                                     | 5                                |
| Copper                                | 7440-50-8      | EPA 200.7           | 1,400   | 10                                     | 4                                |
| Iron                                  | 7439-89-6      | EPA 200.7           | 11,000  | 20                                     | 10                               |
| Lead                                  | 7439-92-1      | EPA 200.7/200.8 (2) | 50  | 150/1                                  | 25/0.1                           |
| Manganese                             | 7439-96-5      | EPA 200.7           | 880   | 5                                      | 0.5                              |
| Mercury, total                        | 7487-94-7      | EPA 245.1           | 11  | 0.2                                    | 0.2                              |
| Nickel                                | 7440-02-0      | EPA 200.7           | 730   | 50                                     | 10                               |
| Selenium                              | 7782-49-2      | EPA 200.7/200.8 (2) | 180   | 500/5                                  | 100/1                            |
| Silver                                | 7440-22-4      | EPA 200.7           | 180   | 15                                     | 4                                |
| Tin                                   | 7440-31-5      | EPA 200.7           | 22,000  | 25                                     | 100                              |
| Thallium                              | 7440-28-0      | EPA 200.7/200.8 (2) | 2.4   | 200/5                                  | 45/0.5                           |
| Vanadium                              | 7440-62-2      | EPA 200.7           | 260   | 10                                     | 3                                |
| Zinc                                  | 7440-66-6      | EPA 200.7           | 11,000  | 20                                     | 4                                |
| <b>General Chemistry</b>              |                |                     |   |  |                                  |
| Fluoride                              | 16984-48-8     | EPA 300.0           | 2000  | 300                                    | Not available                    |
| Chloride                              | 16887-00-6     | EPA 300.0           | 250,000   | 45                                     | Not available                    |
| Sulfate                               | 14808-79-8     | EPA 300.0           | 250,000   | 225                                    | Not available                    |
| Total Dissolved Solids (TDS)          | Not applicable | I-1750 (USGS)       | 500,000   | 10,000                                 | Not available                    |
| <b>Semivolatile Organic Compounds</b> |                |                     |   |  |                                  |
| Phenol                                | 108-95-2       | CLP OLC03.2         | 22,000  | 5                                      | Not available                    |
| 2,4,5-Trichlorophenol                 | 95-95-4        | CLP OLC03.2         | 3,600   | 20                                     | Not available                    |
| 2,4,6-Trichlorophenol                 | 88-06-2        | CLP OLC03.2         | 6.1   | 5                                      | Not available                    |
| 2,4-Dichlorophenol                    | 120-83-2       | CLP OLC03.2         | 110   | 5                                      | Not available                    |
| 2,4-Dimethylphenol                    | 105-67-9       | CLP OLC03.2         | 730   | 5                                      | Not available                    |
| 2,4-Dinitrophenol                     | 51-28-5        | CLP OLC03.2         | 73  | 20                                     | Not available                    |
| 2-Chlorophenol                        | 95-57-8        | CLP OLC03.2         | 30  | 5                                      | Not available                    |
| 2-Methylnaphthalene                   | 91-57-6        | CLP OLC03.2         | 5   | 5                                      | Not available                    |
| 2-Methylphenol                        | 95-48-7        | CLP OLC03.2         | 1,800   | 5                                      | Not available                    |
| 2-Nitrophenol                         | 88-75-5        | CLP OLC03.2         | 5   | 5                                      | Not available                    |
| 4,6-Dinitro-2-methylphenol            | 534-52-1       | CLP OLC03.2         | 5   | 20                                     | Not available                    |
| 4-Chloro-3-methylphenol               | 59-50-7        | CLP OLC03.2         | 5   | 5                                      | Not available                    |
| 4-Methylphenol                        | 106-44-5       | CLP OLC03.2         | 180   | 5                                      | Not available                    |
| 4-Nitrophenol                         | 100-02-7       | CLP OLC03.2         | 290   | 20                                     | Not available                    |
| Acenaphthene                          | 83-32-9        | CLP OLC03.2         | 370   | 0.04 (1)                               | Not available                    |
| Acenaphthylene                        | 208-96-8       | CLP OLC03.2         | 5   | 0.04 (1)                               | Not available                    |

**TABLE 1-3**

Analyte List, Required Reporting Limits, Lab Quantitation Limits and Lab Method Detection Limits  
*Taylor Lumber and Treating*

| Parameter               | CAS        | Method        | Required Project Reporting Limit <sup>1</sup><br>µg/L | Lab Practical Quantitation Limit (PQL) | Lab Method Detection Limit (MDL) |
|-------------------------|------------|---------------|---|--|----------------------------------|
| Anthracene              | 120-12-7   | CLP OLC03.2   | 1,800   | 0.04 (1)                               | Not available                    |
| Benzo(a)anthracene      | 56-55-3    | 8270C-SIM (4) | 0.092   | 0.04 (1)                               | Not available                    |
| Benzo(a)pyrene          | 50-32-8    | 8270C-SIM (4) | 0.0092  | 0.04 (1)                               | Not available                    |
| Benzo(b)fluoranthene    | 205-99-2   | 8270C-SIM (4) | 0.092   | 0.04 (1)                               | Not available                    |
| Benzo(g,h,i)perylene    | 191-24-2   | CLP OLC03.2   | 5   | 0.04 (1)                               | Not available                    |
| Benzo(k)fluoranthene    | 207-08-9   | 8270C-SIM (4) | 0.92  | 0.04 (1)                               | Not available                    |
| Chrysene                | 218-01-9   | CLP OLC03.2   | 9.2   | 0.04 (1)                               | Not available                    |
| Dibenz(a,h)anthracene   | 53-70-3    | 8270C-SIM (4) | 0.0092  | 0.04 (1)                               | Not available                    |
| Fluoranthene            | 206-44-0   | CLP OLC03.2   | 1,500   | 0.04 (1)                               | Not available                    |
| Fluorene                | 86-73-7    | CLP OLC03.2   | 240   | 0.04 (1)                               | Not available                    |
| Indeno(1,2,3-c,d)pyrene | 193-39-5   | 8270C-SIM (4) | 0.092   | 0.04 (1)                               | Not available                    |
| Naphthalene             | 91-20-3    | CLP OLC03.2   | 6.2   | 0.04 (1)                               | Not available                    |
| Phenanthrene            | 85-01-8    | CLP OLC03.2   | 5   | 0.04 (1)                               | Not available                    |
| Pyrene                  | 129-00-0   | CLP OLC03.2   | 180   | 0.04 (1)                               | Not available                    |
| Pentachlorophenol       | 87-86-5    | EPA 515.3     | 0.56  | 0.085 (3)                              | Not available                    |
| 1,2,3,4,6,7,8-HpCDD     | 35822-46-9 | EPA 1613B     | 4.48E-05  | 5.0E-05                                | 9.0E-06                          |
| 1,2,3,4,7,8-HxCDD       | 39227-28-6 | EPA 1613B     | 4.48E-06  | 5.0E-05                                | 9.3E-06                          |
| 1,2,3,6,7,8-HxCDD       | 57653-85-7 | EPA 1613B     | 4.48E-06  | 5.0E-05                                | 8.8E-06                          |
| 1,2,3,7,8,9-HxCDD       | 19408-74-3 | EPA 1613B     | 4.48E-06  | 5.0E-05                                | 8.9E-06                          |
| 1,2,3,7,8-PeCDD         | 40321-76-4 | EPA 1613B     | 4.4821E-07  | 5.0E-05                                | 8.3E-06                          |
| 2,3,7,8-TCDD            | 1746-01-6  | EPA 1613B     | 4.4821E-07  | 1.0E-05                                | 6.3E-06                          |
| OCDD                    | 3268-87-9  | EPA 1613B     | 4.48E-03  | 1.0E-04                                | 1.1E-05                          |
| 1,2,3,4,6,7,8-HpCDF     | 67562-39-4 | EPA 1613B     | 4.48E-05  | 5.0E-05                                | 6.9E-06                          |
| 1,2,3,4,7,8,9-HpCDF     | 55673-89-7 | EPA 1613B     | 4.48E-05  | 5.0E-05                                | 8.2E-06                          |
| 1,2,3,4,7,8-HxCDF       | 70648-26-9 | EPA 1613B     | 4.48E-06  | 5.0E-05                                | 8.2E-06                          |
| 1,2,3,6,7,8-HxCDF       | 57117-44-9 | EPA 1613B     | 4.48E-06  | 5.0E-05                                | 5.5E-06                          |
| 1,2,3,7,8,9-HxCDF       | 72918-21-9 | EPA 1613B     | 4.48E-06  | 5.0E-05                                | 8.7E-06                          |
| 1,2,3,7,8-PeCDF         | 57117-41-6 | EPA 1613B     | 8.96E-05  | 5.0E-05                                | 7.3E-06                          |
| 2,3,4,6,7,8-HxCDF       | 60851-34-5 | EPA 1613B     | 4.48E-06  | 5.0E-05                                | 5.8E-06                          |
| 2,3,4,7,8-PeCDF         | 57117-31-4 | EPA 1613B     | 8.96E-06  | 5.0E-05                                | 4.5E-06                          |
| 2,3,7,8-TCDF            | 51207-31-9 | EPA 1613B     | 4.48E-06  | 1.0E-05                                | 4.5E-06                          |
| OCDF                    | 39001-02-0 | EPA 1613B     | 4.48E-03  | 1.0E-04                                | 1.96E-05                         |

1 = Project reporting limit corresponds to the Tapwater PRG. PQL based on 1-L sample for PAH-SIM method. 3-L will be collected and analyzed to attempt to meet PRG for all PAHs.

2= Samples will be analyzed first using 200.7 (ICP-AES) and only analyzed by 200.8 (ICP-MS) if the reporting limits are not met. Under the PQL and MDL columns they are listed as "200.7 PQL / 200.8 PQL" or "200.7 MDL / 200.8 MDL".

3= Expected PQL based on method

4= Sample from well MW-101S will not require PAH-SIM and PAH results will be obtained from the BNA analysis.

**TABLE 1-6**  
Field Measurement Standards  
*Taylor Lumber and Treating*

| Field Parameter               | Units | Method                        | Accuracy                    |
|-------------------------------|-------|-------------------------------|-----------------------------|
| Water level                   | feet  | Electric tape                 | 0.01 ft                     |
| Temperature                   | °C    | Temperature probe on pH meter | 0.1 °C                      |
| pH                            | none  | Electronic meter              | 0.1 unit                    |
| Specific conductance          | µS/cm | Electronic meter              | 3 significant figures µS/cm |
| Dissolved oxygen              | mg/L  | O2 probe                      | 85%-115%                    |
| Turbidity                     | NTU   | Nephelometer                  | 85%-115%                    |
| Oxidation/reduction potential | mV    | Electronic meter              | 85%-115%                    |

**TABLE 1-7**  
Quality Control Objectives <sup>1</sup>  
*Taylor Lumber and Treating*

| Quality Control Parameter | Measurement             | Metals/Gen Chem | Base-Neutral/Acids (BNA)                             | Dioxins/Dibenzofurans                   |
|---------------------------|-------------------------|-----------------|--|---|
| Accuracy                  | Field and Method Blanks | < MRL           | < MRL  | < MRL                                   |
| Accuracy                  | Calibration Checks      | 90% - 110%      | 80% - 120%(BNA)<br>80% - 120%(PAH)<br>70%-130% (PCP) | EPA 1613B, Table 6                      |
| Accuracy                  | Target Compound Spikes  | ± 25%           | BNAs 20%-120%,<br>PAHs 40%-135%<br>PCP 70%-130%      | Uses labeled spikes every sample        |
| Accuracy                  | Surrogate Spikes        | Not applicable  | Per applicable method                                | EPA 1613B, Table 7 (13C labeled spikes) |
| Precision                 | Laboratory Duplicates   | ± 20%           | ± 20%  | EPA 1613B, Section 15.5, Table 6        |
| Precision                 | Field Duplicates        | ± 25%           | ± 25%  | ± 35%                                   |

<sup>1</sup> = QC Objectives are based on expected method performance. If method or laboratory criteria are more stringent, then those criteria override those presented in this table.

## 2.0 Sample Collection and Handling

This section describes the procedures for sample collection and processing to be performed in support of the groundwater monitoring activities at the Taylor Lumber and Treating Site.

### 2.1 Sampling Activities

During the first quarterly groundwater monitor event:

- Water levels will be measured in all onsite monitor wells
- DNAPL thickness will be measured at all wells.
- Groundwater samples will be obtained from the 18 wells outside the barrier wall
- Groundwater samples will be obtained from two wells inside the barrier wall
- Groundwater samples will be collected from at least two nearby residential wells
- Effluent from the groundwater extraction system will be collected

Wells to be sampled and parameters to be sampled in each well are listed in Table 2-1. Well locations are shown on Figure 1.

**TABLE 2-1**  
Groundwater Sampling Wells  
*Taylor Lumber and Treating*

| Well ID | F,Cl,SO4 | TDS | Color | BNA | PAH | PCP | Metals | Dioxins |
|---------|----------|-----|-------|-----|-----|-----|--------|---------|
| MW-1S   |          |     |       | X   | X   | X   | X      |         |
| MW-6S   |          |     |       | X   | X   | X   | X      | X       |
| MW-6D   |          |     |       | X   | X   | X   | X      |         |
| MW-7S   | X        | X   | X     | X   | X   | X   | X      |         |
| MW-7D   |          |     |       | X   | X   | X   | X      |         |
| MW-9S   | X        | X   | X     | X   | X   | X   | X      | X       |
| MW-10S  | X        | X   | X     | X   | X   | X   | X      | X       |
| MW-11S  |          |     |       | X   | X   | X   | X      |         |
| MW-12S  |          |     |       | X   | X   | X   | X      |         |
| MW-13S  |          |     |       | X   | X   | X   | X      |         |
| MW-14S  |          |     |       | X   | X   | X   | X      |         |
| MW-15S  |          |     |       | X   | X   | X   | X      |         |
| MW-16S  |          |     |       | X   | X   | X   | X      |         |
| MW-101S |          |     |       | X   | X   | X   | X      | X       |
| MW-103S |          |     |       | X   | X   | X   | X      |         |
| MW-104S |          |     |       | X   | X   | X   | X      |         |
| PZ-101  |          |     |       | X   | X   | X   | X      | X       |
| PZ-102  | X        | X   | X     | X   | X   | X   | X      | X       |
| PZ-105  |          |     |       | X   | X   | X   | X      |         |

**TABLE 2-1**  
Groundwater Sampling Wells  
*Taylor Lumber and Treating*

| Well ID               | F,Cl,SO4 | TDS | Color | BNA | PAH | PCP | Metals | Dioxins |
|-----------------------|----------|-----|-------|-----|-----|-----|--------|---------|
| PZ-116                |          |     |       | X   | X   | X   | X      |         |
| RW-01                 | X        | X   | X     | X   | X   | X   | X      | X       |
| RW-02                 | X        | X   | X     | X   | X   | X   | X      | X       |
| Extracted groundwater |          |     |       | X   | X   | X   | X      |         |

## 2.2 Sampling Methods

### 2.2.1 General Conditions

Before sampling, teams must document any site conditions that may affect the quality of the sample. Weather conditions must be recorded, including temperature, wind direction, and precipitation (type and intensity). Other conditions include the presence of airborne particulate such as dust from a gravel road, or the presence of an unusual odor.

Field crews will note the general condition of each monitor well before gauging. Any condition that could compromise the security or construction of the well should be noted. These conditions may include, but are not limited to, the lack, inappropriate use, or poor condition of a lock; absence of an interior well cap; and the settling or cracking of the well pad. When these deficiencies are observed, the field team leader will work with the project manager to institute appropriate actions to remedy the situation.

Before each well is sampled, the headspace will be evaluated for the presence of flammable gases using a photoionization detector (PID) or flame ionization detector (FID). This screening will take place when the security cap is opened and the well cap is removed.

### 2.2.2 Static Water Level Measurements and DNAPL Thickness

The depth to static water level (DTW) is the distance between the marked point on the top edge of the PVC well casing and the static water level. An electronic water level sounder will be used to perform this measurement. The DTW should be measured to the nearest 0.01 foot and recorded, along with the time and date, in the field notebook.

The water level indicator sounding line and probe should be decontaminated after use at each well to avoid possible cross-contamination between wells.

### 2.2.3 Well Purging

Before sampling begins, the well will be purged using a peristaltic pump or Grundfos pump with new or dedicated tubing. Purging will occur from the top 1 foot of the water column. Purge rates will be chosen that minimize drawdown in the well and yield a target sample turbidity of less than 5 nephelometric turbidity units (NTUs). A target maximum drawdown during purging and sampling of the well is 10 percent of the well screen length. Purge rates will be kept to less than 1 gallon per minute (gpm).



A minimum of three purge volumes will be removed, and pumping will continue until two subsequent parameter measurements, taken at least 3 minutes apart, agree to within 10 percent.

The purging method used for each well should be consistent between sampling events.

## 2.2.4 Field Parameters

Water quality parameters to be measured in the field consist of temperature, pH, specific conductance, dissolved oxygen, turbidity, oxidation-reduction potential (ORP), and water levels. The water quality measurements help determine if water removed from a well represents in situ groundwater conditions. An open-top overflow cell or a flow-through cell will be used to prevent atmospheric oxygen from mixing with the sample. Field parameters will be measured at least once per purge volume, as the well is being purged, and once after the sample has been collected.

## 2.2.5 Groundwater Sampling

Whether using a peristaltic pump or a Grundfos (submersible) pump, all groundwater samples can be collected directly from the pump discharge tubing after purging is complete. Teflon™ tubing will be used for all sample collection. Each groundwater sample will be analyzed for all the analytes listed in Table 2-2. This table also presents the requirements for containers, preservatives, and holding times.

Fill the sample containers in the following order:

- 1) Fill 2 x 40-mL amber glass VOA for Pentachlorophenol (unpreserved)
- 2) Fill 4 x 1-L amber glass for PAH-SIM (unpreserved) Sample from well MW-101S (inside barrier does not require PAH-SIM) - Note: This is 3 x 1-L for one sample and 1 x 1-L for a backup sample, i.e. if backup is used PQL will be higher.
- 3) Fill 2 x 1-L amber glass for BNAs (unpreserved)
- 4) MW-6S, MW-9S, MW-10S, MW-101S, PZ-101, PZ-102, RW-01, RW-02 only — Fill 2 x 1-L amber glass for dioxins (unpreserved) — *bottles provided by Triangle Labs*
- 5) Fill 1x 1-L preserved poly bottle for metals and Hg
- 6) MW-7S, MW-9S, MW-10S, PZ-102, RW-01, RW-02 only — Fill 1 x 1-L poly cubitaner for anions and TDS

**For MS/SD site collect:**

- Triple the sample volume for pentachlorophenol (1), PAH-SIM (1), BNAs (3)
- Double the sample volume for metals (5) and anions (6).
- No extra sample for dioxins (4) (not required)

**For Field Duplicate (FD) site collect:**

- Double the sample volume for pentachlorophenol (1), PAH-SIM (2), BNAs (3), dioxins (4) only.

Mark samples from MW-101S and MW-104S (inside barrier) as possibly containing high analyte levels. Little is currently known about the residential wells. A description of the condition and any observable specifications (e.g., I.D. and depth) should be carefully noted in the field book.

## 2.2.6 Effluent Sampling

In the treatment plant area at TLT, groundwater is continuously pumped from four extraction wells (PW-1 through PW-4) into holding tanks or sumps before it is transferred to the evaporator system. Equal volumes of water will be collected from each holding tank/sump and composited into a single effluent sample. A bailer will be used to collect the aliquots into a clean 5-gallon container, and then the sample bottles will be filled from this container.

## 2.2.7 Sample Containers, Preservatives and Holding Times

The FTL is responsible for ensuring proper sampling, labeling of samples, preservation, and shipment of samples to the laboratory to meet required holding times. The required sample containers, preservative requirements, and maximum holding times are shown in Table 2-2.

Precleaned and certified sample containers will be purchased and shipped to the field site before sample collection. The FTL will retain all certificates of analysis for the precleaned containers.

**TABLE 2-2**

Required Sample Containers, Preservation, and Holding Times  
Taylor Lumber and Treating

| Analyses   | Analytical Method      | Sample Matrix | Container <sup>a</sup> | Qty | Preservative <sup>b</sup>           | Holding Time <sup>d</sup> |
|--|------------------------|---------------|------------------------|-----|-------------------------------------|---------------------------|
| <b>Bottle Group A – collected in the same bottle</b>                                       |                        |               |                        |     |                                     |                           |
| F, Cl, SO <sub>4</sub>   | EPA 300.0              | water         | 1-L poly cubitaner     | 1   | Cool 4°C                            | 28 days                   |
| Total Dissolved Solids   | USGS I-1750            | water         | 1-L poly cubitaner     | NA  | Cool 4°C                            | 7 days                    |
| <b>Bottle Group B</b>  |                        |               |                        |     |                                     |                           |
| Pentachlorophenol  | EPA 515.3              | water         | 40-mL VOA              | 2   | Cool 4°C                            | 7/14 days                 |
| <b>Bottle Group C</b>  |                        |               |                        |     |                                     |                           |
| BNAs   | OLC03.2                | water         | 1-L amber glass        | 2   | Cool 4°C                            | 7/40 days                 |
| <b>Bottle Group D – NOTE: For PAHs 3 x 1-L required per sample + 1 x 1-L backup sample</b> |                        |               |                        |     |                                     |                           |
| PAH (SIM)  | SW3510/8270C-SIM       | water         | 1-L amber glass        | 4   | Cool 4°C                            | 7/14 days                 |
| <b>Bottle Group E – collected in the same bottle</b>                                       |                        |               |                        |     |                                     |                           |
| Metals (Total)   | EPA 200.7 and/or 200.8 | water         | 1-L poly bottle        | 1   | Cool 4°C, HNO <sub>3</sub> , pH < 2 | 6 months                  |
| Mercury  | EPA 245.1              | water         | Combined with metals   |     |                                     | 28 days                   |
| <b>Bottle Group F</b>  |                        |               |                        |     |                                     |                           |
| Dioxins and Furans   | EPA 1613B              | water         | 1-L amber glass        | 2   | Cool 4°C                            | 30/45 days <sup>e</sup>   |

Notes:

<sup>a</sup>Glass containers will be sealed with Teflon®-lined screw caps.

<sup>b</sup>All samples will be stored promptly at 4°C in insulated chest.

**TABLE 2-2**

Required Sample Containers, Preservation, and Holding Times  
Taylor Lumber and Treating

| Analyses | Analytical Method | Sample Matrix | Container <sup>a</sup> | Qty | Preservative <sup>b</sup> | Holding Time <sup>d</sup> |
|----------|-------------------|---------------|------------------------|-----|---------------------------|---------------------------|
|----------|-------------------|---------------|------------------------|-----|---------------------------|---------------------------|

<sup>c</sup>days to extraction for water/days for analysis.

<sup>d</sup>Holding times are from the time of sample collection.

<sup>e</sup>30 days to extraction for water, 45 days for analysis

Sources: SW-846, third edition, Update III (June 1997), OLC03.2, ILM04.1., EPA 1613B, EPA 515.3, EPA200.7, EPA 200.8, EPA 300.0, EPA 110.2, USGS I-1750.

**TABLE 2-3**

Sample Summary  
Taylor Lumber and Treating

| Parameter           | Method                | Field Samples | Field Duplicates | MS/MSD | Field Blanks | Equipment Rinse Blanks | Total Number of Samples |
|---------------------|-----------------------|---------------|------------------|--------|--------------|------------------------|-------------------------|
| Cl, SO <sub>4</sub> | EPA 300.0             | 6             | 1                | 1/1    | 1            | 1                      | 11                      |
| TDS                 | USGS I-1750           | 6             | 1                | 1/1    | 1            | 1                      | 11                      |
| PCP (3)             | EPA 515.3             | 23            | 1                | 1/1    | 1            | 1                      | 28                      |
| BNA                 | OLC03.2               | 23            | 1                | 1/1    | 1            | 1                      | 28                      |
| PAH-SIM (1)         | PAH-SIM               | 22            | 1                | 1/1    | 1            | 1                      | 27                      |
| Metals (2)          | 200.7/200.8/<br>245.1 | 23            | 1                | 1/1    | 1            | 1                      | 28                      |
| Dioxins             | 1613B                 | 8             | 1                | 0/0    | 1            | 1                      | 10                      |

Note 1 – PAH-SIM analysis not conducted on MW-101 therefore field samples = 22

Note 2 – 200.8 (ICP-MS) analysis only carried out if non-detect results from 200.7 are above the requested project reporting limit

Note 3 – Relatively high historical values for PCP have been found in MW-101S (1 mg/L) and MW-104S (0.5 mg/L) – dilutions may be required using Method 515.3 or PCP may be taken from OLC03.2 analysis for these sites.

## 2.2.8 Decontamination of Field Equipment

All field meters and probes will be cleaned and rinsed with tap water and deionized water between sample locations and at the end of each sampling event. Decontamination includes a wash in an Alconox detergent solution, a rinse with tap water, and a rinse with deionized water.

## 2.2.9 Sample Disposal and Management of Investigation-Derived Waste

The laboratory will be responsible for disposing retained samples in accordance with the contract and applicable regulations.

Materials generated during the sampling event will include purged groundwater, used Teflon™ tubing, used groundwater filters, rinsate from equipment decontamination, and used PPE. Purged groundwater and rinsate will be stored in 55-gallon drums until disposal into the onsite Stormwater Treatment System. Used supplies and PPE will be disposed of at the facility waste disposal site.

## 2.3 Sample Handling and Custody Requirements

Components of sample custody procedures include the use of field logbooks, sample labels, custody seals, and COC forms. Each person involved with sample handling will be trained in COC procedures before the start of the field program. The COC form will accompany the samples during shipment from the field to the laboratory.

The following procedures will be used when transferring the samples for shipment:

### 2.3.1 Field Custody

The following procedures will be used to document, establish, and maintain custody of field samples:

- Sample labels will be completed for each sample with waterproof ink, making sure that the labels are legible and affixed firmly on the sample container.
- All sample-related information will be recorded in the project logbook.
- The field sampler will retain custody of the samples until they are transferred or properly dispatched.
- To simplify the COC record and minimize potential problems, as few people as possible should handle the samples. For this reason, one individual from the field sampling team will be designated as the responsible individual for all sample transfer activities. This field investigator will be responsible for the care and custody of the samples until they are properly transferred to another person or facility.
- A COC form will accompany all samples. This record documents transfer of custody of samples from the field sampler to the laboratory. When transferring the possession of samples, the individuals relinquishing and receiving will sign, date, and note the time on the record.
- Samples will be properly packaged for shipment and sent to the appropriate laboratory for analysis with a separate signed COC form, enclosed in a plastic bag, and taped inside the cover of each sample box or cooler. The original record will accompany the shipment, and a copy will be retained by the FTL. When samples are relinquished to shipping companies for transport the tracking number will be recorded on the COC form.
- The COC must be signed when relinquished by field personnel and signed by the laboratory receiving the samples.
- Custody seals will be used on the shipping containers when samples are shipped to the laboratory to inhibit sample tampering during transportation.

### 2.3.2 Laboratory Sample Custody

Each laboratory receiving samples for this project must comply with the laboratory sample custody requirements outlined in its Quality Assurance Plan (QAP). The following procedures will be used by the laboratory sample custodian in maintaining the COC once the samples have arrived at the laboratory:

- The laboratory will designate a sample custodian who will be responsible for maintaining custody of the samples and for maintaining all associated records documenting that custody.
- The laboratory will check to see that there has been no tampering with the custody seals on the coolers.
- Upon receipt of the samples, the custodian will check the original COC and request-for-analysis documents and compare them with the labeled contents of each sample container for corrections and traceability. The sample custodian will sign the COC and record the date and time received in the "Received by Laboratory" box.
- The sample custodian also will assign a unique laboratory sample number to each sample.
- Cooler temperature (temperature vial) will be checked and recorded.
- Care will be exercised to annotate any labeling or descriptive errors. If discrepancies occur in the documentation, the laboratory will immediately contact the sample tracking coordinator and project chemist as part of the corrective action process. A qualitative assessment of each sample container will be performed to note anomalies, such as broken or leaking bottles. This assessment will be recorded as part of the incoming COC procedure.
- Samples will be stored in a secured area and at a temperature of  $4^{\circ} \pm 2^{\circ}\text{C}$ , if necessary, until analyses are to begin.
- Copies of the COC and request-for-analysis forms will accompany the laboratory report and will become a permanent part of the project records.

### 2.3.3 Sample Packing and Shipping

Samples will be delivered to the designated laboratory by a common carrier such as Federal Express. During the field effort, the project chemist (Laura Castrilli/EPA for Manchester or CLP Lab and Scott Echols/CH2M HILL for Triangle Labs) will contact the laboratory daily to inform it about shipments. Hard plastic ice chests or coolers with similar durability will be used for shipping samples. The coolers must be able to withstand a 4-foot drop onto solid concrete in the position most likely to cause damage. Double contain sample bottles in ziplock bags, and group by sample set. Styrofoam or bubble wrap will be used as packing material to protect the samples from leakage during shipment.

Coolers will be packed with ice, and double bagged in ziplock baggies. A volume of ice equal to sample volume should be present in each cooler. Blue ice will not be used. Ice volume will be recorded in field notebook. After packing is complete, the cooler will be taped shut, with COC seals affixed across the top and bottom joints.

## 2.4 Laboratory Contacts and Addresses

Samples will be sent to the following laboratories for analyses:

**For General Chemistry, BNAs, PAHs, PCP, and metals**

Manchester Environmental Laboratory

7411 Beach Drive East

Port Orchard, WA 98366

Phone 360-871-8800

FAX 360-871-8850

Attn: Karen Norton/ESAT

Sample Shipment Coordinator

**For Dioxin**

Triangle Laboratories, Inc.

Attn: Sample Custodian

2445 S. Alston Ave.

Durham, NC 27713-1301

919.544.5729

FAX: (919) 544-5491

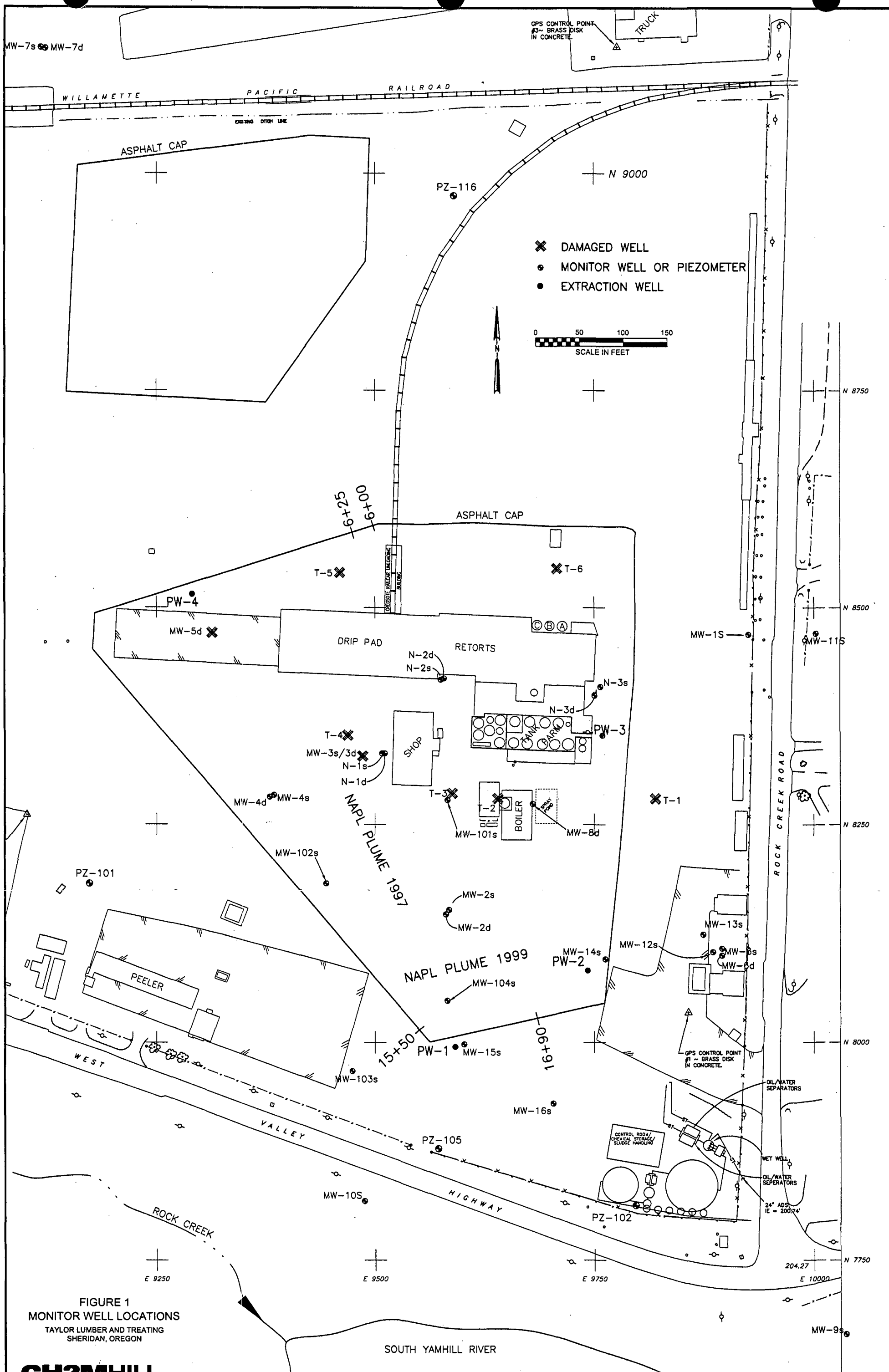


FIGURE 1  
MONITOR WELL LOCATIONS  
TAYLOR LUMBER AND TREATING  
SHERIDAN, OREGON

## 3.0 Quality Control Requirements

### 3.1 Project Quality Control Checks

Field duplicates, equipment blanks, and matrix spike/matrix spike duplicates (MS/MSDs) will be submitted to the laboratory as part of the field QA/QC program. Trip blanks will not be submitted because none of the samples will be analyzed for VOCs. A brief description and frequency of the QC samples are included in Tables 3-1 and 3-2. Where possible, the sample, the sample duplicate, and the MS/MSD sample will be taken from the same sample location.

Laboratory QA/QC procedures are also described in Table 3-1. These include method blanks, laboratory blank spikes, surrogate spikes, and calibration check samples.

Sample coolers, bottles, preservatives and temperature blanks will be provided by CH2M HILL for samples shipped to the Manchester Laboratory. Triangle Laboratories, Inc. will supply coolers, bottles, and temperature blanks for the dioxins/furans analysis samples.

**TABLE 3-1**  
QA/QC Procedures and Frequency  
*Taylor Lumber and Treating*

| QC Check                    | Information Provided                        | Description   |
|-----------------------------|---|---|
| <b>Blanks</b>               |   |   |
| Field Blanks                | Contamination from equipment rinse water    | Samples of rinse water prior to use<br><u>1 per source of equipment blank water</u>   |
| Equipment Rinse Field Blank | Contamination from total sampling procedure | Samples of reagent grade, analyte free water passed through and over the surface of decontaminated sampling equipment. ERBs are used to monitor the effectiveness of the decontamination process. The rinse water is collected in sample bottles, preserved, and handled in the same manner as the samples. One ERB will be collected for each sampling event or each type of sampling equipment, whichever is more frequent, and analyzed for the same parameters as the corresponding samples.<br><u>Non-dedicated sampling devices - are not expected to be used this sampling event.</u><br><u>New or dedicated sampling devices – once first day of sampling and once the last day of sampling</u> |
| Laboratory Method blank     | Contamination from laboratory procedure     | Samples of reagent water processed through the analytical procedure to monitor lab contamination.<br><u>1 per analytical batch of 20 field samples or less</u>  |



**TABLE 3-1**  
**QA/QC Procedures and Frequency**  
*Taylor Lumber and Treating*

| QC Check                           | Information Provided                         | Description   |
|------------------------------------|--|---|
| <b>Spikes</b>                      |  |   |
| Matrix spike/ spike duplicate      | Analytical bias due to matrix and method     | Laboratory QC samples designed to monitor the effect of the sample matrix on the accuracy and precision of analytical results. Not required for dioxins/furans analysis as each sample is spiked with a labeled analog.<br><br><u>5% of samples (minimum 1 pair per matrix)</u>   |
| Laboratory blank spike             | Analytical bias due to method                | Laboratory QC samples designed to monitor the effect of the method on the accuracy and precision of analytical results.<br><br><u>1 per analytical batch of 20 field samples or less</u>  |
| Surrogate spike                    | Analytical method bias                       | Compounds added to each organics sample to assess bias of the analytical procedure.<br><br><u>Added to every organic sample (BNA, PAH, dioxins)</u>   |
| <b>Calibration Check Samples</b>   |  |   |
| Calibration blank check            | Carryover, memory                            | Analytical system blank   |
| Continuing calibration check       | Calibration drift                            | Assesses calibration accuracy on day of analysis<br><br><u>Daily, per method requirements</u>   |
| Secondary source calibration check | Calibration accuracy                         | Independent check of calibration accuracy<br><br><u>Each type initial calibration is performed</u>  |
| <b>Replicates</b>                  |  |   |
| Field replicates                   | Precision of all steps after sample is taken | "blind" to the laboratory, collected to monitor the precision of the field sampling process. The field team leader will choose at least 10 percent of the total number of sample locations known or suspected to contain moderate contamination as the duplicate field samples. The identity of the duplicate field samples will be recorded in the field-sampling logbook, and this information will be forwarded to the data quality evaluation team to aid in the review and evaluation of the data.<br><br><u>10% of samples (minimum 1 per matrix)</u> |
| Laboratory replicates              | Analytical precision                         | Analytical precision  |
| Analysis replicates                | Instrumental precision                       | Instrumental precision (for EPA 245.1 only, not required by other methods)  |

## 3.2 Field and Laboratory Corrective Action

### 3.2.1 Field Corrective Action

Any problems encountered in the field should be documented. If general field practices or other standard procedures were deviated from, a corrective action report should be

completed, including any measures undertaken to resolve the issue(s). Corrective actions may include:

- correcting COC forms
- changing procedures to correct problems in sample collection, packing, and shipping
- evaluating and amending sampling procedures
- re-sampling

### **3.2.2 Laboratory Corrective Action**

Details of laboratory corrective actions are described in the appropriate lab QAP.

## **4.0 Instrument Maintenance and Calibration**

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### **4.1 Maintenance**

All equipment used for field measurements will be maintained in accordance with the manufacturer's instructions. Routine maintenance and all equipment repairs will be documented in the site logbook. Whenever a piece of equipment fails to operate properly, the instrument either will be repaired in-house if possible, or sent out for repairs, and another instrument equivalent to the original will be substituted, if possible.

Preventive maintenance for laboratory instruments is discussed in greater detail in the laboratory's QAP.

### **4.2 Calibration**

#### **4.2.1 Field Instruments**

Field instruments will be calibrated daily before beginning sampling activities. All field instruments will be calibrated in accordance with the manufacturer's specifications. Standards used to calibrate the field survey instruments will be certified. The method and frequency of calibration for the instruments used for each field activity are described in the manufacturer's instructions and summarized briefly in Table 4-1.

For each instrument, the calibration method, apparatus, standards, and testing frequency should be documented in the field notebook.

#### **4.2.2 Laboratory Equipment**

Laboratory instruments will be calibrated in accordance with the manufacturer's directions and appropriate method requirements. Laboratory instrument calibration procedures will be summarized in the Laboratory QAP will be reviewed and approved by the PM or his designee before samples are submitted to the laboratory.

**TABLE 4-1**  
**Instrument Calibration and Frequency**  
*Taylor Lumber and Treating*

| <b>Instrument</b>           | <b>Calibration Activity</b>   | <b>Frequency</b>                    |
|-----------------------------|---|-------------------------------------|
| Dissolved Oxygen Meter      | Air calibration to 100% saturation  | Beginning of each sampling activity |
| Oxidation Reduction Meter   | Calibrate to Zobell Solution  | Beginning of each sampling activity |
| Turbidity Meter             | Calibrate to standard(s) supplied by manufacturer   | Beginning of each sampling activity |
| Water Level Indicator       | Check operation   | Beginning of each sampling activity |
| Organic Vapor Analyzer      | Calibrate with zero and span gas according to Health and Safety Plan (HSP) specifications     | Beginning of each sampling activity |
| pH Meter                    | Calibrate against standard pH solutions (4.0SU, 7.0SU, 10.0SU) using 2 or 3 point calibration | Beginning of each sampling activity |
| Specific Conductivity Meter | Check reading with a solution of known conductivity (e.g., 1,000 $\mu$ S/cm standard)         | Beginning of each sampling activity |

## 5.0 Data Management Plan

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The scope of the Data Management Plan (DMP) includes planning, collecting, evaluating, and reporting information gathered during the data collection activity.

### 5.1 Sample Management

The **field team leader** will be responsible for properly labeling each sample. Each label will designate a unique EPA Sample Number (assigned by the EPA chemist), and a Location ID Number (obtained from the CH2M HILL data manager) that identifies from which well, depth and date the sample was collected. Sample labels and Location ID Numbers are described in the next subsection.

The **field team leader** will also be responsible for sequencing the collection and analysis of the QA/QC samples so those appropriate samples are included in each analytical batch. When applicable, QA/QC samples will be referenced to the associated field sample using the unique Sample ID.

The **field team leader** will be responsible for management and security of the samples while in the field and will be responsible for proper shipment of the samples the laboratory.

#### 5.1.1 Sample Identification

Groundwater samples will be identified by the well identifier, sample or well depth, and the sampling date, such as:

TTXXXd-DDMMYY-\*

- TT = One or two character well type designation, for example, MW
- XX = three-digit well number, for example, MW008
- d = depth specification, either S (shallow – gravel alluvium) or D (deep – siltstone), for example, MW08D
- DD = day of the month
- MM = month
- YY = Last two digits of current year
- = 0 for normal environmental sample
- = 1 for field duplicate sample
- = 2 for a rinsate blank

For example:

**PZ116S-110202-1:** Field duplicate sample collected from PZ-116, from within the gravel alluvium, on February 11, 2002

### 5.1.2 Sample Labels

Prior to collection of a particular sample, all the containers needed for the different analyses should be properly labeled. The sample label should be attached directly to the sample container.

The information that should be included on the sample label includes:

- Project name
- Sample ID—unique identification for each sample location
- Date sampled
- Time sampled—in military time
- Initials of sampler(s)
- Analysis for which the particular container is intended
- Preservative in the sample container, if any

## 5.2 Data Management

### 5.2.1 Initial Data Verification

The unique laboratory batch and SampleID will be used for correspondence with the laboratory. The laboratory will deliver the analytical data to the **EPA chemist** in both hard-copy and electronic format with references to each applicable laboratory batch and SampleID. The laboratory deliverable will be reviewed by the EPA chemist to verify that the appropriate electronic information matches the hard copy lab reports, and all data can be accounted for.

### 5.2.2 Data Validation

The **EPA chemist** will review the electronic database file and supporting hard-copy reports to assess the quality of the data with respect to the project-specific DQOs, as described in the QAPP. Data validation procedures are described in EPA National Functional Guidelines for Data Review (EPA, 1994a, 1994b). Procedures are summarized in Section 7 of this document. The data validation personnel will edit the original hard copy laboratory reports in blue or black pen. Validation modifications are then applied to the electronic database.

### 5.2.3 Data Entry

After the data has been verified and validated the EPA chemist will send it to the CH2M HILL **data manager** to load into the Taylor database. Other data from the sampling event will be entered into the database, including water level data and field measurements. Other types of data elements may be added to this list as the project needs and activities evolve.

#### **5.2.4 Data Use and Reporting**

Once the information in the database is complete and validated, it will be used by various members of the project team to support the technical evaluations regarding site conditions and remediation strategies. The expected data evaluation activities include statistical reduction, nature and extent evaluation, trend analysis, and risk assessment.

All statistical analyses, data listings and analytical reports will be generated from the working database with the assistance of the data manager.

## 6.0 Assessments and Oversight

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Assessment and oversight activities are performed to determine whether the QC measures identified in the work plan and QAPP are being implemented and documented as required. Audits and reviews are the tools to implement this process. For example, during a review the auditor may check that a monitoring well has been correctly sampled or that the field QC samples were collected at the appropriate frequency. During an audit or review, the auditor may check for:

- Adherence to the site-specific plans
- Documentation of the process or system
- Proper identification, resolution, and documentation of nonconformance with the process or system
- Correction of identified deficiencies

### 6.1 Assessments and Response Actions

Although no audits are currently planned for the groundwater monitoring, an audit may, at some time, be recommended by the EPA. Assessment activities may include surveillance, inspection, peer review, management system review, readiness review, technical systems audit, performance evaluation, and data quality assessment. The PM, with assistance from the program chemist, will be responsible for initiating audits, selecting the audit team, and overseeing audit implementation.

Audits of the analytical laboratories will be performed in accordance with the laboratory subcontract. Laboratory audits will be performed by the program chemist or designee in compliance with the subcontract.

Field audits will be conducted by the program QA manager or designee per the project requirements.

#### 6.1.1 Laboratory Performance and Systems Audits

Laboratory systems will be audited in accordance with program or project requirements. Contracted laboratories must submit a Laboratory QAP. The QAP must include relevant standard operating procedures, a description of the laboratory's internal procurement policies, and its corrective action program.

The laboratory audits will address at least the following issues:

- Is the laboratory operation being performed as required by the subcontract.
- Are internal laboratory operations being conducted in accordance with the laboratory QAP.



- Are the laboratory analyses being performed in accordance with method requirements.

Any nonconformance noted during an audit will result in a corrective action.

### **6.1.2 Field Team Performance and System Audits**

The program chemist or a designated representative will conduct audits of the field activities in accordance with the program requirements. The audit will address at least the following issues:

- Are sampling operations being performed as stated in the site-specific work plan?
- Are the sample labels being filled out completely and accurately?
- Are the COC records complete and accurate?
- Are the field notebooks being filled out completely and accurately?
- Are the sampling activities being conducted in accordance with the site-specific work plan and approved SOPs?
- Are the documents generated in association with the field effort being stored as described in the site-specific work plan?

The generation and documentation of field data will also be audited. The audits will focus on verifying that proper procedures are followed so that subsequent sample data will be valid. Any nonconformance noted during an audit will result in corrective action.

The results of the assessment and oversight activities will be reported back to the PM, who has ultimate responsibility for ensuring that the corrective action response is completed, verified, and documented.

## **6.2 Reports to Client**

Reports to the EPA program managers include project status reports, the results of evaluation and system audits, data quality assessments, and significant QA and recommended solutions. The status reports, submitted in accordance with the requirements of site-specific work plan, will discuss current activities, problems encountered and their resolution, and planned work.

QA reports will be submitted in accordance with the site-specific work plan. QA reports document implementation of the QAPP and the results of the site-specific QA/QC audits. A final QA report must be submitted as part of each project's final report. The topics to be covered are outlined in the site-specific work plan, but each will include at least the following information:

- Identification of nonconformances that required corrective action and resolution of the nonconformance
- Data quality assessment in terms of precision and accuracy and how they affect the usability of the analytical results

- Limitations of the qualified results and a discussion of rejected results
- Discussion of the field and laboratory QA/QC sample results
- Results of external laboratory audits.

## 7.0 Data Review, Validation, and Verification Requirements

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### 7.1 Data Review and Validation

Data review and validation are processes whereby data generated in support of this project are reviewed against the QA/QC requirements. The data are evaluated for precision, accuracy, and completeness against the analytical protocol requirements. Nonconformances or deficiencies that could affect the usability of data are identified as noted. The conventional approach to data validation involves the EPA's Laboratory Data Validation Functional Guidelines.

#### 7.1.1 Level 1—Field Survey Data

Field instruments used to collect field survey (or bulk measurements such as pH or conductivity) are direct reading, thus making field calculations and subsequent data reduction unnecessary. Field data will be recorded in the site logbooks by appropriately trained field personnel. Field data will include the following:

- Well location and depth information
- Instrument identification
- Calibration information (standards used and results)
- Date and time of calibration and sample measurement
- Sample results
- Supporting information if appropriate

Data will be reviewed by the FTL, who is responsible for the collection and verification of all field data while in the field. Recorded data will be accepted or rejected by the FTL before leaving the sampling site. Extreme readings (readings that appear significantly different from other readings at the same site) will be accepted only after the instrument has been checked for malfunction and/or if the readings are verified by retesting.

Field documentation, sample data, instrument calibrations, and QC data will be reviewed by the PM (or a designee) before being included in the project files.

#### 7.1.2 Level 3—Laboratory Analyses

Data will be reviewed following the process outlined in the following U.S. Environmental Protection Agency (EPA) guidance documents for evaluating data:

- *Contract Laboratory Program National Functional Guidelines for Organic Data Review* (EPA, 1994a); and
- *Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (EPA, 1994b).

Sample results that were not within the acceptance limits will be appended with a qualifying flag, which consisted of a single- or double-letter code that indicated a possible problem with the data. The qualifying flags may originate during the data review, validation, and database query processes. They are then included in the data summary tables so that the data is not used indiscriminately.

All metals data will be flagged as estimated if it is below the PQL and above the MDL.

The purpose of the DQE process is to assess the effect of the overall field sampling and analytical process on the usability of environmental data collected during Taylor Lumber and Treating Site sampling. Two major data evaluation categories are laboratory performance and matrix interferences. Evaluation of laboratory performance is a compliance check of whether the laboratory analyzed the samples within the analytical method specifications. Evaluation of matrix interferences is subtler and involves the analysis of several types of results, including surrogate spike recoveries, matrix spike recoveries, and duplicate sample results.

## 7.2 Validation and Verification Methods

Data will be reviewed following the process outlined in the following U.S. Environmental Protection Agency (EPA) guidance documents for evaluating data:

- *Contract Laboratory Program National Functional Guidelines for Organic Data Review* (EPA, 1994a); and
- *Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (EPA, 1994b).
- *USEPA Region 10 PCDD/TCDD Data Validation Standard Operating Procedure, 01/96*

The entire data set will be reviewed for trends, such as blank contamination or unacceptable spike recoveries, which would indicate that the data did not meet the project-specific quality objectives.

## 7.3 Reconciliation with Data Quality Objectives

The final activity of the data quality evaluation is to assess whether the data meets the planned DQOs for this project. The final results, as adjusted for the findings of any data validation/data evaluation, will be checked against the DQOs and an assessment will be made as to whether the data is of sufficient quality to support the DQOs. The decision as to data sufficiency may be affected by the overall precision, accuracy, and completeness of the data as demonstrated by the data validation process. If the data are sufficient to achieve project objectives, the PM will release the data and work can proceed. If the data are insufficient, corrective action will be required.

Appendix D-2  
Phase 2 Field Investigation Quality  
Assurance Project Plan

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*Draft*

# **Phase 2 Field Investigation Quality Assurance Project Plan**

**Taylor Lumber and Treating  
Superfund Site**

Prepared for

**U.S. Environmental Protection Agency**

**WA No. 125-RICO-10FI  
RAC V Contract No. 68-W6-0025**

July 2002

**CH2MHILL**

# **TAYLOR LUMBER AND TREATING SITE PHASE 2 FIELD INVESTIGATION MONITORING QUALITY ASSURANCE PROJECT PLAN (QAPP)**

## **APPROVED:**

CH2M HILL Project Chemist

Date

CH2M HILL Project Manager

Date

EPA QA Officer

Date

EPA Project Manager

Date

## **QAPP Distribution List**

Laura Castrilli/EPA  
Scott Echols/CH2M HILL  
Chris Hall/EPA  
Justin Iverson/CH2M HILL  
Trish Larson/CH2M HILL  
Loren McPhillips/EPA  
Scott McKinley/CH2M HILL  
Mike Niemet/CH2M HILL  
Chris Pace/EPA  
Dennis Shelton/CH2M HILL  
Robin Strauss/CH2M HILL  
Laboratories

## **Data Distribution List**

Loren McPhillips/EPA  
Trish Larson/CH2M HILL

Hardcopy Data from Manchester Lab and CLP Lab  
Hardcopy Data, EDD

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# 1.0 Project Management

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## 1.1 Project Organization

The names and responsibilities of key project personnel that will be involved in groundwater monitoring at Taylor Lumber and Treating Superfund Site (TLT) are listed below in Table 1-1.

## 1.2 Problem Definition and Background

### 1.2.1 Background

Taylor Lumber and Treating (TLT) Superfund Site is a lumber mill and wood treating facility located in northwest Oregon on the east slope of the coast range. TLT has been the subject of over a dozen environmental inspections, investigations, and actions, and a number of reports and data sets have been generated for the site. Recently, the *Integrated Assessment* (IA) (E&E, 1999) was completed, collecting samples from all media to assess the site contamination for subsequent removal activities.

Based on results from the IA, several remedial activities were conducted to address the site contamination that posed “an imminent and substantial danger to public health or welfare or the environment.” These activities were described in the *Removal Action Report* (RA) (E&E, 2001). Activities included the installation of a bentonite barrier wall to contain the dense non-aqueous-phase liquid (DNAPL) plume beneath the treatment plant area. The wall was keyed into the underlying siltstone, the surface inside the barrier wall was paved, and a groundwater extraction system was constructed within the contained area. In addition, a portion of the Treated Pole Storage area was capped to prevent exposure to arsenic-contaminated soil. Finally, areas of adjacent ditches that contained high levels of arsenic were excavated.

For the *Phase 1 Remedial Investigation Report* (CH2M HILL, 2001), the data from the IA and the RA were collated into a database and compared against risk-based screening values. The report presents the results of the screening analysis on contaminant distribution maps and, based on those results, discusses the nature and extent of contamination at the site. The report concludes by identifying the data gaps that need to be addressed before the Phase 2 Remedial Investigation (RI), baseline risk assessment (BLRA), and feasibility study can be completed. Generally, the data gaps relate to the unknown effectiveness of the barrier wall, and the need for a more definitive and current understanding of the nature and extent of the remaining site-related contamination.

## 1.2.2 Problem Statement

The goal of the Phase 2 Field Investigation is to address all the data needs identified in the *Phase 1 RI Report*.

## 1.2.3 Objectives and Data Needs

The data needs that were called out in the *Phase 1 RI Report*, grouped under broader objectives, are listed below.

### ***To Verify Effectiveness of Removal Actions***

Determine how the barrier wall changed the hydrology and groundwater flow pattern

Determine how effectively the barrier wall contains the contaminants in the groundwater beneath the treatment plant area

Confirm that the stormwater collection system is effectively containing onsite surface runoff

### ***To Determine the Extent of Remaining Contamination***

Delineate areas of high soil contamination in the Treated Pole Storage and treatment plant area

Delineate contamination in ditches

Determine the extent of contaminated groundwater and soil in the vicinity of the treatment plant area

Estimate the volume of DNAPL beneath the treatment plant area

### ***For Baseline Risk Assessment***

Determine potential for exposure to local residences and to the river via groundwater based on a current groundwater data set

Determine surface soil contaminant concentrations at residences along Rock Creek Road and Highway 18B

Provide current sediment data from South Yamhill River

Provide surface soil and groundwater data from the East Facility

Identify background arsenic levels in soil

### ***Miscellaneous***

Characterize material in the contaminated soil storage cells for assessing disposal options

Complete a Level 1 Ecological Scoping Assessment

Characterize hydraulic interaction between lower alluvial water-bearing zone and siltstone

---

## 1.3 Project Task Description and Schedule

The primary tasks of the Phase 2 Field Investigation are:

- Installation of 7 new monitoring wells; four in the West Facility and 3 in the East Facility.
- Installation of geoprobes outside the barrier wall and subsequent groundwater and soil sampling.
- Surface soil sampling from the Treated Pole Storage area, West Facility treatment plant area, the East Facility and from 6 nearby residences.
- Sampling on-site and off-site ditches at a total of 12 locations.
- Collecting a total of 6 sediment samples from the north bank of the South Yamhill River.

The sample locations are shown in Figures 1 through 4.

### 1.3.1 Applicable Technical Quality Standards

The analytical method, estimated quantitation limit, tapwater, residential and industrial preliminary remediation goal (PRG) are given Table 1-2. Table 1-3 lists the comparison value for each type.

### 1.3.2 Project Quality Assessment Techniques

Quality assessments will be performed during the execution of this project in the order they are listed in Table 1-4.

### 1.3.3 Anticipated Work Schedule

A tentative schedule for the first quarter sample collection, lab analyses and data review is shown below.

| Task  | Tentative Schedule          |
|---|-----------------------------|
| QAPP completed and sent to EPA  | June 25                     |
| EPA reviews QAPP  | June 25 to July 3           |
| QAPP approved   | July 3                      |
| Conduct Field Investigation   | July 29 to August 9         |
| Lab sample receipt complete   | August 13                   |
| Conduct lab analyses  | July 30 to September 3      |
| Hard copy and e-data sent to EPA<br>(Manchester Lab and CLP) or CH2M HILL<br>(Triangle Lab) | September 4                 |
| Data reviewed and validated   | September 4 to September 18 |
| Validated data sent to CH2M HILL project<br>chemist and data manager                        | September 18                |

| Task                       | Tentative Schedule           |
|----------------------------|------------------------------|
| Data loaded into database  | September 18 to September 20 |
| Data ready for project use | September 23                 |

## 1.4 Quality Objectives and Criteria for Measurement Data

This subsection defines the levels of data quality that will be required for Taylor Lumber and Treating Remedial Investigation. This subsection also provides the quantitative quality objectives and measurement performance criteria for the analytical data.

### 1.4.1 Data Quality Objectives (DQOs)

Data quality objectives (DQOs) are both qualitative and quantitative statements that define the type, quality, and quantity of data necessary to support project decisions. The intended final use of the groundwater monitoring data will include risk evaluation and decision-making for potential interim actions and for the feasibility study. DQOs for the Phase 2 Field Investigation are summarized in Section 1.2 of this document and a discussion of the development of the project-specific DQOs is presented in the *Taylor Lumber and Treating Field Phase 2 Field Investigation Work Plan* (CH2M HILL, June 2002).

### 1.4.2 Analytical Method Selection

The analytical methods were chosen such that in most cases the estimated quantitation limit (EQL) for each parameter is lower than the comparison values described in Tables 1-2 and 1-3. The methods are from the Contract Laboratory (CLP) Statements of Work or their SW-846 method equivalents depending on whether the samples are analyzed by a CLP laboratory, the Manchester EPA Laboratory, or a lab outside the CLP system.

For soil or sediment samples that will be compared directly to the applicable Residential PRG (as opposed to the 10 times the PRG) or the Aquatic Sediment Screening Value (ASSV) a GCMS-SIM analysis method will be used to obtain reporting limits below the comparison values.

The following analytes have estimated quantitation limits (EQLs) greater than the comparison value:

- Arsenic - The residential PRG is below the expected background level of As therefore the EQL of 1 mg/kg is acceptable.
- 1,2,3,7,8-PeCDD - The expected EQL is within 2 times the ASSV and is acceptable.

For the water samples obtained from the Geoprobe, the requested methods for As, pentachlorophenol and several of the polynuclear aromatic hydrocarbons (PAHs) yield an EQL higher than 10 times the Tapwater PRG. This data will be used for nature and extent and the 10x Tapwater PRG comparison value is being used as a target value rather than a strict limit for comparison. It is expected that these water samples will have limited volume (insufficient volume for PAHs by selected ion monitoring, SIM) and may also have high particulate and/or possible high dissolved solids, making it difficult to achieve the estimated water quantitation limits listed in Table 1-2. Therefore, even though the requested

methods for As, pentachlorophenol and several of the PAHs have EQL values higher than 10 times the Tapwater PRG they are suitable for analysis of the geoprobe water.

**Geoprobe water samples special instructions** – The geoprobe water samples are expected to contain high levels of solids. Before extraction for semivolatile organic compounds (SVOCs) or digestion for metals the laboratory should allow the solids to settle and then decant the water only for extraction or analysis.

### 1.4.3 Method Performance Objectives

The sampling approach and rationale are based on the DQOs and the primary purpose for each sample type is shown in Table 1-3.

The comparison values for soil and sediment samples used in the Baseline Risk Assessment (BLRA) will be the Residential PRG for offsite residence samples and the Industrial PRG for the East Facility samples on the site. The Aquatic Sediment Screening Values (ASSV) will be used for comparison to the riverbank sediment samples.

The soil and geoprobe water samples to be used for the contamination delineation and nature and extent portion of the investigation will be compared to 10x multiples of the relevant PRG (Tapwater, residential or industrial).

The Tapwater PRG, Residential PRG, Industrial PRG, and EQL for each target analyte are shown in Table 1-2.

### 1.4.4 Levels of Data Quality

Two categories of data will be collected as part of this field effort, and each category has a different level of supporting QA/QC documentation. Measurements requiring U.S. EPA Level 1 QA/QC documentation will be the field measurement of organic vapor (OVM). Samples submitted to the laboratory for analysis will require U.S. EPA Level 3 QA/QC documentation. For each QC level, the measures and methods to be used, as well as the applicable data package deliverables, are outlined below.

#### Level 1–Field Survey Data

Field-monitoring activities do not require formal data package deliverables. Organic Vapor (OVM) response levels for site safety and sample screening use will be a Level 1 field activity.

Monitoring results, as well as pertinent data concerning the sampling event, will be documented in the bound field notebook. Level 1 documentation will consist of the following:

- Location/soil sampling depth/well depth readings (Geoprobe only)
- Instrument identification
- Calibration information (standards used and results)
- Date and time of calibration and sample measurements
- Sample results

The logbooks will be reviewed by the FTL for completeness and correctness. No additional documentation or data quality evaluation is required.

### Level 3–Laboratory Analysis

Laboratory analysis of samples for the analytes listed in Table 1-2 requires a Level 3 data package containing sample results and summaries of all the QA/QC data. The data package will include the information, but not necessarily in the exact format, requested in all the forms listed in the CLP SOW OLM04.2, ILM04.1 or DLM01.4, as appropriate.

#### 1.4.5 Quality of Data

Analytical performance requirements are expressed in terms of precision, accuracy, representativeness, comparability, completeness, and sensitivity (PARCCS). Summarized below are definitions for each PARCCS parameter.

Table 1-5 summarizes the level of accuracy required for the laboratory samples.

#### Precision

Precision is the measure of the scatter of a group of measurements, made under identical conditions, about their mean value. The overall precision of the measurement system is a combination of sampling precision and analytical precision. Sampling, or field duplicate precision, can be assessed by collecting and analyzing duplicate field samples. Analytical (laboratory) precision is derived from the analysis of a duplicate created in the laboratory from one or more of the investigative samples. Sampling precision is defined as the combination of sampling and analytical precision and is represented by the difference between field duplicate measurements. Precision is typically measured by analyzing field duplicate and laboratory duplicate samples (sample duplicate, matrix spike duplicate, check standard duplicate, and/or laboratory blank duplicate). Precision is most frequently expressed as standard deviation (s), percent relative standard deviation (%RSD), coefficient of variation (CV), or relative percent difference (RPD). The numeric QC limits for precision are shown in Table 1-5. Field duplicate samples will be collected at a frequency of 1 in 10 samples. The precision of a duplicate determination can be expressed as the relative percent difference (RPD), as calculated as

$$RPD = \{(|X_1 - X_2|) / (X_1 + X_2) / 2\} \times 100 = \left\{ \frac{|X_1 - X_2|}{\frac{(X_1 + X_2)}{2}} \right\} \times 100$$

$X_1$  = native sample  
 $X_2$  = duplicate sample

#### Accuracy

Accuracy is the measure of agreement between an analytical result (or the mean of several results) and its true or accepted value. Deviations from a standard value represent the cumulative errors in the measurement system. Potential sources of error include (but are not limited to) sample collection, sample preservation, sample handling, matrix effects, sample analysis, and data reduction. Sampling and field sample handling accuracy is normally assessed by collecting field blanks and analyzing them for the parameters of interest. A field blank should report no targeted parameter at a concentration greater than the practical quantitation limit (PQL) or minimum reporting limit (MRL). If these limits are exceeded, the

source of contamination will be investigated and corrective action taken. Analytical laboratory accuracy is determined by comparing results from the analysis of matrix spikes, surrogates, or check standard samples to the known values. Accuracy, defined as percent recovery (P), is calculated as

$$P = \left[ \frac{(SSR - SR)}{SA} \right] \times 100$$

SSR=spiked sample result, SR=sample result (native), and SA=the spike concentration added to the spiked sample

Numeric QC limit objectives for accuracy are shown in Table 1-5. For some compounds (in particular the phenolics) these criteria may be difficult to achieve; however, in such cases the data still must meet method and laboratory internal limits for quality control criteria.

### **Representativeness**

Representativeness is a qualitative measure of the degree to which sample data accurately and precisely represent a characteristic environmental condition. Representativeness is a subjective parameter and is used to evaluate the efficacy of the sampling plan design. Representativeness is demonstrated by providing full descriptions of the sampling techniques and the rationale used for selecting sampling locations in the project planning documents.

Representativeness is a qualitative parameter that will be controlled by the proper design and management of the sampling Project. Good representativeness will be achieved through:

- Careful, informed selection of sampling sites,
- Selection of testing parameters and methods that adequately define and characterize the groundwater samples,
- Proper gathering and handling of samples so as to avoid interferences and prevent contamination and loss, and
- Collection of a sufficient number of samples to allow a statistically valid monitoring project.

### **Completeness**

Completeness is defined as the percentage of measurements that are judged to be valid compared to the total number of measurements made for a specific sample matrix and analysis. Completeness is calculated using the following formula:

$$\text{Completeness} = \frac{\text{Valid Measurements}}{\text{Total Measurements}} \times 100$$

Completeness is defined as the percentage of measurements that are judged to be valid measurements. Factors that negatively affect completeness include the following:

- Missing scheduled sampling events
- Submitting improper quantity of sample
- Sample leakage or breakage in transit or during handling



- Exceeding holding times
- Losing sample during laboratory analysis through accident or improper handling
- Improper documentation such that traceability is compromised
- Reported field and analytical data that is of insufficient sensitivity

The completeness requirement is based on the number of samples required by the sampling plan. A completeness objective of at least 90 percent of the data specified by the FSP is the goal established for this Project.

### **Comparability**

Comparability is another qualitative measure designed to express the confidence with which one data set may be compared to another. Sample collection and handling techniques, sample matrix type, and analytical method all affect comparability.

Comparability is limited by the other PARCCS parameters because data sets can be compared with confidence only when precision and accuracy are known. Data from one phase of an investigation can be compared to others when similar methods are used and similar data packages are obtained.

### **Sensitivity**

Sensitivity is the measure of the concentration at which an analytical method can positively identify and report analytical results. The sensitivity of a given method is commonly referred to as the detection limit. Although there is no single definition of this term, the following terms commonly used to measure sensitivity are defined below.

- **Instrument detection limit (IDL)** is the minimum concentration that can be measured from instrument background noise and is normally only measured for metals parameters.
- **Method detection limit (MDL)** is a statistically determined concentration. It is the minimum concentration of an analyte that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero as determined in the same or a similar matrix. Because of the lack of information on analytical precision at this level, sample results greater than the MDL but less than the PQL will be laboratory qualified as "estimated."
- **Estimated Quantitation Limit (EQL) or Practical quantification limit (PQL)** is the sample volume or dry weight adjusted concentration of the target analyte that the laboratory has demonstrated the ability to measure within specified limits of precision and accuracy during routine laboratory operating conditions. This value is variable and highly matrix dependent. It is the minimum concentration that will be reported as "unqualified" by the laboratory. For organics analysis and inorganic ions this corresponds to the lowest calibration standard used.

## **1.5 Special Training Requirements and Certifications**

Field personnel are enrolled in the CH2M HILL Comprehensive Health and Safety Program and meet state and federal hazardous waste operations requirements for 40-hour initial training, 3-day on-the-job experience, and 8-hour annual refresher training. Employees

designated "SSC" have completed a 12-hour site safety coordinator course, and have documented requisite field experience. An SSC with a level designation (D, C, B) equal to or greater than the level of protection being used must be present during all tasks performed in exclusion or decontamination zones.

## 1.6 Documentation and Records

This section defines which records are critical to the project and what information needs to be included in reports, as well as the data reporting format and the document control procedures to be used.

Project activities must be properly documented and those records stored and maintained. The CH2M HILL PM will be responsible for organizing, storing, and cataloging all project information. Individual project team members may maintain separate notebooks for individual tasks and these notebooks will be transferred to the PM at the end of the project during project closeout.

### 1.6.1 Field Operation Records

The information contained in these records documents overall field operations and generally consist of the following:

**Sample collection records.** Field personnel will use a project notebook to record all pertinent information and to describe sampling procedures. After completion of the sampling activities, the field notebooks will be in the custody of the PM. Each notebook will be identified by the project-specific document number, and each page will be numbered. Personnel will update the project notebooks daily during field activities. At a minimum, this documentation should include:

- the names of the persons conducting the activity,
- subcontractor personnel,
- time of arrival and departure at the site,
- health and safety monitoring records
- sample number and sample collection points,
- maps and diagrams,
- equipment methods used,
- climatic conditions,
- and any unusual observations.

All original data recorded in field logbooks, sample labels, and COC forms will be written with waterproof, indelible ink. If an error is the individual should make all corrections simply by crossing a line through the error, initialing and dating the correction, and entering the correct information.

**Chain-of-custody records.** Chain-of –custody (COC) records document the progression of samples as they travel from the original sampling location to the laboratory.

**QC sample records.** These records document the generation for QC samples, such as field, trip, and equipment rinsate blanks and duplicate samples. They also include documentation

on sample integrity and preservation and include calibration and standards' traceability documentation capable of providing a reproducible reference point. QC sample records should contain information on the frequency, conditions, level of standards, and instrument calibration history.

**Corrective action reports.** Corrective action reports show what methods were used in cases where general field practices or other standard procedures were deviated from and include the methods used to resolve noncompliance.

### 1.6.2 Laboratory Records

In general, data report packages from the laboratory must contain the same documentation controls and be in a similar format as to those required for CLP organics and inorganic work. The following list describes some of the laboratory-specific records that should be compiled if available and appropriate:

**Sample Data.** These records contain the times that samples were analyzed to verify that they met the holding times prescribed in the analytical methods. Included should be the overall number of samples, sample location information, any deviations from the SOPs, time of day, and date. Corrective action procedures to replace samples violating the protocol also should be noted.

**Sample Management Records.** Sample management records document sample receipt, handling and storage, and scheduling of analyses. The records verify that the chain-of-custody and proper preservation were maintained, reflect any anomalies in the samples (such as receipt of damaged samples), note proper log-in of samples into the laboratory, and address procedures used to ensure that holding time requirements were met.

**Test Methods.** Unless analyses are performed exactly as prescribed by SOPs, this documentation will describe how the analyses were carried out in the laboratory. This includes sample preparation and analysis, instrument standardization, detection and reporting limits, and test-specific QC criteria. Documentation demonstrating laboratory proficiency with each method used could be included.

**QA/QC Reports.** These reports will include the general QC records, such as initial demonstration of capability, instrument calibration, routine monitoring of analytical performance, calibration verification, etc. Project-specific information from the QA/QC checks such as blanks (field, reagent, rinsate, and method), spikes (matrix, matrix spike replicate, analysis matrix spike, and surrogate spike), calibration check samples (zero check, span check, and mid-range check), replicates, splits, and so on should be included in these reports to facilitate data quality analysis.

### 1.6.3 Data Handling Records

Data handling records document protocols used in data reduction, verification, and validation. Data reduction addresses data transformation operations such as converting raw data into reportable quantities and units, use of significant figures, recording of extreme values, blank corrections, etc. Data verification ensures the accuracy of data transcription and calculations, if necessary, by checking a set of computer calculations manually. Data validation ensures that QC criteria have been met.

#### **1.6.4 Data Reporting Package Format and Documentation Control**

The format of all data reporting packages must be consistent with the requirements and procedures used for data validation and data assessment described in Section 7 of this document. All individual records that represent action taken to achieve the objective of the data operation and the performance of specific QA functions are potential components of the final data reporting package.

**TABLE 1-1**  
Project Personnel  
*Taylor Lumber and Treating*

| Title   | Responsibility  | Name   | Phone   |
|---|---|--|---|
| EPA Project Manager   | Coordinates all of the project efforts. Interfaces directly with the CH2M HILL Project Manager  | Loren McPhillips/EPA   | 206-553-4903                                    |
| CH2M HILL Project Manager/ CH2M HILL Project QA Manager           | Responsible for the coordination and execution of all work items associated with project planning and implementation. Liaison between program-level managers and project-level team members. Identifies team members and project assignments. Manages and tracks schedule and budget. Ensures that all tasks are completed by assigned team members within schedule and budget constraints. | Robin Strauss/CH2M HILL<br>2300 NW Walnut Blvd.<br>Corvallis, OR 97330<br><a href="mailto:Rstrauss@ch2m.com">Rstrauss@ch2m.com</a>   | 542-758-0235<br>ext. 3520                       |
| EPA Regional Sample Control Coordinator (RSCC)                    | Responsible for coordinating analytical services with Manchester Laboratory. Coordinates sample shipments to Manchester laboratory, monitors lab TAT.   | Laura Castrilli/EPA<br><a href="mailto:Castrilli.laura@epa.org">Castrilli.laura@epa.org</a><br>Or Chris Hall/EPA<br><a href="mailto:Hall.Christopher@epamail.epa.gov">Hall.Christopher@epamail.epa.gov</a> | 206-553-4323<br>fax (206)-553-8210              |
| EPA QA Officer  | Reviews laboratory QAPP, validates data from CLP laboratories and generates data validation summary report.   | Chris Pace/EPA<br><br><a href="mailto:pace.chistophr@epamail.gov">pace.chistophr@epamail.gov</a>   | 206-553-1792                                    |
| CH2M HILL Data Manager  | Responsible for the preparing chain of custody's, sample bottle labels. Utilizes project database to produce data summary reports under direction of the project manager.   | Trish Larson/CH2M HILL<br>2300 NW Walnut Blvd.<br>Corvallis, OR 97330<br><a href="mailto:Plarson@ch2m.com">Plarson@ch2m.com</a>  | (541) 758-0235<br>ext. 3512                     |
| CH2M HILL Project Chemist   | Coordinates chemistry issues for CH2M HILL. Interact with EPA Chemist on QAPP; sample bottle prep and data validation issues. Prepares QAPP, point of contact for non-CLP laboratories.   | Scott Echols/CH2M HILL<br>2300 NW Walnut Blvd.<br>Corvallis, OR 97330<br><a href="mailto:Sechols@ch2m.com">Sechols@ch2m.com</a>  | 541-758-0235<br>ext. 3148                       |
| CH2M HILL Toxicologist  | Responsible for conducting baseline risk assessment activities.   | Dennis Shelton/CH2M HILL<br>2300 NW Walnut Blvd.<br>Corvallis, OR 97330<br><a href="mailto:dshelton@ch2m.com">dshelton@ch2m.com</a>  | 541-758-0235<br>ext. 3524                       |
| CH2M HILL Hydrogeologist  | Responsible for hydrogeologic analysis of data  | Scott McKinley/CH2M HILL<br>2300 NW Walnut Blvd.<br>Corvallis, OR 97330<br><a href="mailto:Smckinle@ch2m.com">Smckinle@ch2m.com</a>  | 541-758-0235<br>ext. 3514                       |
| CH2M HILL Field Team Leader and CH2M HILL Site Safety Coordinator | Oversees field activities and implements the FSP. As SSC will implement the Health and Safety Plan in the field.  | Barry Collom/CH2M HILL<br>2300 NW Walnut Blvd.<br>Corvallis, OR 97330<br><a href="mailto:Bcollom@ch2m.com">Bcollom@ch2m.com</a>  | 541-758-0235<br>ext. 3687<br>Cell: 541-740-3250 |

**TABLE 1-1**  
Project Personnel  
*Taylor Lumber and Treating*

| <b>Title</b>                                   | <b>Responsibility</b>  | <b>Name</b>                     | <b>Phone</b>                        |
|--|--|---------------------------------|-------------------------------------|
| Triangle Lab Project Manager –                 | Will serve as the laboratory contact and communicate through the CH2M HILL project chemist to coordinate sample bottle delivery, field sample delivery schedule and data delivery schedules. | Norman Hoffa /Contracts Manager | 919-281-4031<br>919-544-5491<br>fax |
| CLP Lab Project Manager – (Liberty Analytical) | Will serve as the laboratory contact and communicate through the EPA RSSC chemist to coordinate sample bottle delivery, field sample delivery schedule and data delivery schedules.          | Alice Evans                     | 919-379-4100                        |
| HILL Applied Sciences Lab Project Manager      | Will serve as the laboratory contact and communicate through the CH2M HILL project chemist to coordinate sample bottle delivery, field sample delivery schedule and data delivery schedules. | Katy McKinley                   | 541-758-0235<br>ext. 3144           |

**TABLE 1-2**

Sample Analyte List, Analytical Methods, Comparison Values, and Estimated Quantitation Limits  
*Taylor Lumber and Treating*

| Analyte                              | Groundwater                |                    |                             |                                     | Soils and Sediment                      |                        |                       |                                      |
|--------------------------------------|----------------------------|--------------------|-----------------------------|-------------------------------------|---|------------------------|-----------------------|--------------------------------------|
|                                      | Analytical Method Selected | Tapwater PRG, µg/L | 10 times Tapwater PRG, µg/L | Estimated Quantitation Limit (ug/L) | Aquatic Sediment Screening Value, mg/kg | Residential PRG, mg/kg | Industrial PRG, mg/kg | Estimated Quantitation Limit (mg/kg) |
| <b>Metals</b>                        |                            |                    |                             |                                     |   |                        |                       |                                      |
| Aluminum                             | ILM04.1                    | na                 | na                          | na                                  | -----                                   | 76142                  | 100000                | 40                                   |
| Antimony                             | ILM04.1                    | na                 | na                          | na                                  | -----                                   | 31.3                   | 818                   | 12                                   |
| Arsenic                              | ILM04.1                    | <b>0.045</b>       | <b>0. 45</b>                | <b>10</b>                           | 9.79                                    | <b>0.390</b>           | 2.73                  | <b>2</b>                             |
| Barium                               | ILM04.1                    | na                 | na                          | na                                  | -----                                   | 5375                   | 100000                | 40                                   |
| Beryllium                            | ILM04.1                    | na                 | na                          | na                                  | -----                                   | 154                    | 2242                  | 1                                    |
| Cadmium                              | ILM04.1                    | na                 | na                          | na                                  | 0.99                                    | 37.0                   | 809                   | 1                                    |
| Chromium, total                      | ILM04.1                    | 109                | 1090                        | 10                                  | 43.4                                    | 30.1                   | 64.0                  | 2                                    |
| Cobalt                               | ILM04.1                    | na                 | na                          | na                                  | -----                                   | 4693                   | 100000                | 10                                   |
| Copper                               | ILM04.1                    | 1400               | 14000                       | 25                                  | 31.6                                    | 2905                   | 75908                 | 5                                    |
| Iron                                 | ILM04.1                    | na                 | na                          | na                                  | -----                                   | 23463                  | 100000                | 20                                   |
| Lead                                 | ILM04.1                    | na                 | na                          | na                                  | 35.8                                    | 400                    | 750                   | 0.6                                  |
| Manganese                            | ILM04.1                    | na                 | na                          | na                                  | -----                                   | 1762                   | 32250                 | 3                                    |
| Mercury, total                       | ILM04.1                    | na                 | na                          | na                                  | 0.18                                    | 23.5                   | 613                   | 0.1                                  |
| Nickel                               | ILM04.1                    | na                 | na                          | na                                  | 22.7                                    | 1564                   | 40877                 | 8                                    |
| Selenium                             | ILM04.1                    | na                 | na                          | na                                  | -----                                   | 391                    | 10220                 | 1                                    |
| Silver                               | ILM04.1                    | na                 | na                          | na                                  | -----                                   | 391                    | 10220                 | 2                                    |
| Thallium                             | ILM04.1                    | na                 | na                          | na                                  | -----                                   | 5.16                   | 135                   | 2                                    |
| Vanadium                             | ILM04.1                    | na                 | na                          | na                                  | -----                                   | 547                    | 14308                 | 10                                   |
| Zinc                                 | ILM04.1                    | na                 | na                          | na                                  | 121                                     | 23463                  | 100000                | 4                                    |
| <b>Semivolatile Organics (SVOCs)</b> |                            |                    |                             |                                     |   |                        |                       |                                      |
| Phenol                               | OLM04.2                    | na                 | na                          | na                                  | -----                                   | 36662                  | 100000                | 0.330                                |
| 2,4,5-Trichlorophenol                | OLM04.2                    | na                 | na                          | na                                  | -----                                   | 6110                   | 88092                 | 0.830                                |
| 2,4,6-Trichlorophenol                | OLM04.2                    | na                 | na                          | na                                  | -----                                   | 44.2                   | 224                   | 0.330                                |
| 2,4-Dichlorophenol                   | OLM04.2                    | na                 | na                          | na                                  | -----                                   | 183                    | 2643                  | 0.330                                |
| 2,4-Dimethylphenol                   | OLM04.2                    | na                 | na                          | na                                  | -----                                   | 1222                   | 17618                 | 0.330                                |
| 2,4-Dinitrophenol                    | OLM04.2                    | na                 | na                          | na                                  | -----                                   | 122                    | 1762                  | 0.830                                |
| 2-Chlorophenol                       | OLM04.2                    | na                 | na                          | na                                  | -----                                   | 63.4                   | 241                   | 0.330                                |
| 2-Methylnaphthalene                  | OLM04.2                    | 6.2                | 62                          | 10                                  | -----                                   | 55.9                   | 189                   | 0.330                                |
| 2-Methylphenol                       | OLM04.2                    | na                 | na                          | na                                  | -----                                   | 3055                   | 44046                 | 0.330                                |
| 2-Nitrophenol                        | OLM04.2                    | na                 | na                          | na                                  | -----                                   | -----                  | -----                 | 0.330                                |
| 4,6-Dinitro-2-methylphenol           | OLM04.2                    | na                 | na                          | na                                  | -----                                   | -----                  | -----                 | 0.830                                |
| 4-Chloro-3-methylphenol              | OLM04.2                    | na                 | na                          | na                                  | -----                                   | -----                  | -----                 | 0.330                                |
| 4-Methylphenol                       | OLM04.2                    | na                 | na                          | na                                  | -----                                   | 306                    | 4405                  | 0.330                                |
| 4-Nitrophenol                        | OLM04.2                    | na                 | na                          | na                                  | -----                                   | 489                    | 7047                  | 0.830                                |

TABLE 1-2

Sample Analyte List, Analytical Methods, Comparison Values, and Estimated Quantitation Limits  
Taylor Lumber and Treating

| Analyte                  | Groundwater                |                    |                             |                                     | Soils and Sediment                      |                        |                       |                                      |
|--------------------------|----------------------------|--------------------|-----------------------------|-------------------------------------|---|------------------------|-----------------------|--------------------------------------|
|                          | Analytical Method Selected | Tapwater PRG, µg/L | 10 times Tapwater PRG, µg/L | Estimated Quantitation Limit (ug/L) | Aquatic Sediment Screening Value, mg/kg | Residential PRG, mg/kg | Industrial PRG, mg/kg | Estimated Quantitation Limit (mg/kg) |
| Acenaphthene             | OLM04.2 GCMS-SIM           | 365                | 3650                        | 10                                  | 0.176                                   | 3682                   | 38358                 | 0.330 0.025 (SIM)                    |
| Acenaphthylene           | OLM04.2 GCMS-SIM           | 6.2                | 62                          | 10                                  | -----                                   | 55.9                   | 189                   | 0.330 0.025 (SIM)                    |
| Anthracene               | OLM04.2 GCMS-SIM           | 1825               | 18,250                      | 10                                  | <b>0.0572</b>                           | 21896                  | 100000                | 0.330 0.025 (SIM)                    |
| Benzo(a)anthracene       | OLM04.2 GCMS-SIM           | <b>0.092</b>       | <b>0.92</b>                 | <b>10</b>                           | 0.108                                   | 0.621                  | 2.89                  | 0.330 0.025 (SIM)                    |
| Benzo(a)pyrene           | OLM04.2 GCMS-SIM           | <b>0.0092</b>      | <b>0.092</b>                | <b>10</b>                           | <b>0.15</b>                             | <b>0.0621</b>          | <b>0.29</b>           | 0.330 0.025 (SIM)                    |
| Benzo(b)fluoranthene     | OLM04.2 GCMS-SIM           | <b>0.092</b>       | <b>0.92</b>                 | <b>10</b>                           | <b>0.15</b>                             | 0.621                  | 2.89                  | 0.330 0.025 (SIM)                    |
| Benzo(g,h,i)perylene     | OLM04.2 GCMS-SIM           | 6.2                | 62                          | 10                                  | -----                                   | 55.9                   | 189                   | 0.330                                |
| Benzo(k)fluoranthene     | OLM04.2 GCMS-SIM           | 0.92               | 9.2                         | 10                                  | -----                                   | 6.21                   | 28.9                  | 0.330 0.025 (SIM)                    |
| Chrysene                 | OLM04.2 GCMS-SIM           | 9.2                | 92                          | 10                                  | <b>0.166</b>                            | 62.3                   | 289                   | 0.330 0.025 (SIM)                    |
| Dibenz(a,h)anthracene    | OLM04.2 GCMS-SIM           | 9.2                | 92                          | 10                                  | <b>0.033</b>                            | <b>0.0621</b>          | <b>0.29</b>           | 0.330 0.025 (SIM)                    |
| Fluoranthene             | OLM04.2 GCMS-SIM           | 1500               | 15,000                      | 10                                  | 0.423                                   | 2294                   | 30100                 | 0.330 0.025 (SIM)                    |
| Fluorene                 | OLM04.2 GCMS-SIM           | 240                | 2400                        | 10                                  | 0.0774                                  | 2644                   | 33133                 | 0.330 0.025 (SIM)                    |
| Indeno (1,2,3-c,d)pyrene | OLM04.2 GCMS-SIM           | <b>0.092</b>       | <b>0.92</b>                 | <b>10</b>                           | 0.15                                    | 0.62                   | 2.89                  | 0.330 0.025 (SIM)                    |
| Naphthalene              | OLM04.2 GCMS-SIM           | 6.2                | 62                          | 10                                  | 0.176                                   | 55.9                   | 189                   | 0.330 0.025 (SIM)                    |
| Phenanthrene             | OLM04.2 GCMS-SIM           | 6.2                | 62                          | 10                                  | 0.204                                   | 55.9                   | 189                   | 0.330 0.025 (SIM)                    |
| Pyrene                   | OLM04.2 GCMS-SIM           | 180                | 1800                        | 10                                  | 0.195                                   | 2309                   | 54224                 | 0.330 0.025 (SIM)                    |
| Pentachlorophenol        | OLM04.2                    | <b>0.56</b>        | <b>5.6</b>                  | <b>25</b>                           | -----                                   | 2.98                   | 11.1                  | 0.830                                |
| <b>Dioxins/Furans</b>    |                            |                    |                             |                                     |   |                        |                       |                                      |
| 1,2,3,4,6,7,8-HpCDD      | EPA 1613B                  | na                 | na                          | na                                  | 0.0030                                  | 0.00039                | 0.00273               | 0.000005                             |
| 1,2,3,4,7,8-HxCDD        | EPA 1613B                  | na                 | na                          | na                                  | 0.0000066                               | 0.000039               | 0.000273              | 0.000005                             |
| 1,2,3,6,7,8-HxCDD        | EPA 1613B                  | na                 | na                          | na                                  | 0.00033                                 | 0.000039               | 0.000273              | 0.000005                             |
| 1,2,3,7,8,9-HxCDD        | EPA 1613B                  | na                 | na                          | na                                  | 0.00033                                 | 0.000039               | 0.000273              | 0.000005                             |
| 1,2,3,7,8-PeCDD          | EPA 1613B                  | na                 | na                          | na                                  | <b>0.0000033</b>                        | <b>0.0000039</b>       | 0.0000273             | <b>0.000005</b>                      |
| 2,3,7,8-TCDD             | EPA 1613B                  | na                 | na                          | na                                  | -----                                   | 0.0000039              | 0.0000273             | 0.000001                             |
| OCDD                     | EPA 1613B                  | na                 | na                          | na                                  | 0.033                                   | 0.039                  | 0.273                 | 0.00001                              |
| 1,2,3,4,6,7,8-HpCDF      | EPA 1613B                  | na                 | na                          | na                                  | 0.00033                                 | 0.00039                | 0.00273               | 0.000005                             |
| 1,2,3,4,7,8,9-HpCDF      | EPA 1613B                  | na                 | na                          | na                                  | 0.00033                                 | 0.00039                | 0.00273               | 0.000005                             |
| 1,2,3,4,7,8-HxCDF        | EPA 1613B                  | na                 | na                          | na                                  | 0.000033                                | 0.000039               | 0.000273              | 0.000005                             |



**TABLE 1-2**

Sample Analyte List, Analytical Methods, Comparison Values, and Estimated Quantitation Limits  
*Taylor Lumber and Treating*

| Analyte           | Groundwater                |                    |                             |                                     | Soils and Sediment                      |                        |                       |                                      |
|-------------------|----------------------------|--------------------|-----------------------------|-------------------------------------|---|------------------------|-----------------------|--------------------------------------|
|                   | Analytical Method Selected | Tapwater PRG, µg/L | 10 times Tapwater PRG, µg/L | Estimated Quantitation Limit (ug/L) | Aquatic Sediment Screening Value, mg/kg | Residential PRG, mg/kg | Industrial PRG, mg/kg | Estimated Quantitation Limit (mg/kg) |
| 1,2,3,6,7,8-HxCDF | EPA 1613B                  | na                 | na                          | na                                  | 0.000033                                | 0.000039               | 0.000273              | 0.000005                             |
| 1,2,3,7,8,9-HxCDF | EPA 1613B                  | na                 | na                          | na                                  | 0.000033                                | 0.000039               | 0.000273              | 0.000005                             |
| 1,2,3,7,8-PeCDF   | EPA 1613B                  | na                 | na                          | na                                  | 0.000066                                | 0.000078               | 0.000547              | 0.000005                             |
| 2,3,4,6,7,8-HxCDF | EPA 1613B                  | na                 | na                          | na                                  | 0.000033                                | 0.000039               | 0.000273              | 0.000005                             |
| 2,3,4,7,8-PeCDF   | EPA 1613B                  | na                 | na                          | na                                  | 0.000066                                | 0.000078               | 0.000547              | 0.000005                             |
| 2,3,7,8-TCDF      | EPA 1613B                  | na                 | na                          | na                                  | 0.000066                                | 0.000039               | 0.000273              | 0.000001                             |
| OCDF              | EPA 1613B                  | na                 | na                          | na                                  | 0.033                                   | 0.039                  | 0.27                  | 0.00001                              |

## Definitions:

ug/L – micrograms per Liter

na - not analyzed by the laboratory

-- - no benchmark was available

**TABLE 1-3**  
Sampling Objectives  
Taylor Lumber and Treating

| Sample Location  | Sample Type                   | Parameters/<br>Methods -<br>Laboratory                     | Number<br>of Field<br>Samples | Purpose                          | Comparison<br>Value |
|--|-------------------------------|--|-------------------------------|----------------------------------|---------------------|
| Soils-SVOCs and Metals   |                               |  |                               |                                  |                     |
| Treated pole storage area (WF)                                   | Soil samples 0-2 feet         | SVOC (OLM04.2),<br>metals (ILM04.1)<br><br>CLP Lab         | 15                            | Delineate areas of contamination | 10x Industrial PRG  |
| Treated pole storage area (WF)                                   | Soil samples 0-6 inches       | SVOC (OLM04.2),<br>metals (ILM04.1)<br><br>CLP Lab         | 3                             | For comparison to deeper samples | 10x Industrial PRG  |
| Outside barrier wall (GP)  | Soil (apparent contamination) | PAH and PCP (OLM04.2),<br>metals (ILM04.1)<br><br>CLP Lab  | 3                             | Nature and Extent                | 10x Industrial PRG  |
| Well Installation/ Sitewide (MW)                                 | Soil (apparent contamination) | Metals (ILM04.1)<br>PCP and PAHs(OLM04.2)<br><br>CLP Lab   | 3                             | Nature and Extent                | 10x Industrial PRG  |
| Total Number of SVOC/metals Field Samples for 10x Industrial PRG |                               |  | 24                            |                                  |                     |
| Soils-Dioxins  |                               |  |                               |                                  |                     |
| Treated pole storage area (WF)                                   | Soil samples 0-2 feet         | dioxins (selected locations) (SW8290)<br><br>Triangle Labs | 2                             | Delineate areas of contamination | 10x Industrial PRG  |
| Treated pole storage area (WF)                                   | Soil samples 0-6 inches       | dioxins (selected locations) (SW8290)<br><br>Triangle Labs | 2                             | For comparison to deeper samples | 10x Industrial PRG  |
| Total Number of Dioxin Field Samples for 10x Industrial PRG      |                               |  | 4                             |                                  |                     |

**TABLE 1-3 CONTINUED**

Sampling Objectives

*Taylor Lumber and Treating***Soils-SVOCs and Metals**

|                             |                 |                                     |    |                                 |                     |
|-----------------------------|-----------------|-------------------------------------|----|---------------------------------|---------------------|
| Onsite/offsite ditches (DS) | Soil 0-6 inches | SVOC (OLM04.2),<br>metals (ILM04.1) | 15 | Delineate contaminated segments | 10x Residential PRG |
| <b>CLP Lab</b>              |                 |                                     |    |                                 |                     |

Onsite/offsite ditches

15

**Total Number of SVOC/metals Field Samples for 10x Residential PRG**

**Soils-Dioxins**

|                             |                 |  |   |                                 |                     |
|-----------------------------|-----------------|--|---|---------------------------------|---------------------|
| Onsite/offsite ditches (DS) | Soil 0-6 inches | dioxins (selected locations)<br>(SW8290) | 5 | Delineate contaminated segments | 10x Residential PRG |
|-----------------------------|-----------------|--|---|---------------------------------|---------------------|

**Triangle Labs**

**Total Number of Dioxin Field Samples for 10x Residential PRG Limits**

5

**Soils-SVOCs and Metals**

|                  |                         |                                     |    |                                 |                  |
|------------------|-------------------------|-------------------------------------|----|---------------------------------|------------------|
| Residences (RES) | Surface soil 0-2 inches | SVOC (OLM04.2),<br>metals (ILM04.1) | 12 | Baseline Risk Assessment (BLRA) | Residential PRGs |
|------------------|-------------------------|-------------------------------------|----|---------------------------------|------------------|

**CLP Lab**

**Total Number of SVOC/metals Field Samples for Residential PRG Limits**

12

**Soils-Dioxins**

|                  |                         |  |   |                                 |                  |
|------------------|-------------------------|--|---|---------------------------------|------------------|
| Residences (RES) | Surface soil 0-2 inches | dioxins (selected locations)<br>(SW8290) | 6 | Baseline Risk Assessment (BLRA) | Residential PRGs |
|------------------|-------------------------|--|---|---------------------------------|------------------|

**Triangle Labs**

**Total Number of Dioxin Field Samples for Residential PRG Limits**

6

**Soils-SVOCs and Metals**

|                   |                         |                                     |    |      |                 |
|-------------------|-------------------------|-------------------------------------|----|------|-----------------|
| East Facility(EF) | Surface soil 0-6 inches | SVOC (OLM04.2),<br>metals (ILM04.1) | 12 | BLRA | Industrial PRGs |
|-------------------|-------------------------|-------------------------------------|----|------|-----------------|

**CLP Lab**

TABLE 1-3 CONTINUED

## Sampling Objectives

## Taylor Lumber and Treating

|                           |                                  |  |   |                                       |                |
|---------------------------|----------------------------------|--|---|---------------------------------------|----------------|
| Soil Storage Cells (CELL) | Representative composite samples | SVOC (OLM04.2)/Metals (ILM01.4) and Dioxins – (SW8290)/<br><b>Triangle Lab</b> | 3 | For consideration of disposal options | Industrial PRG |
|---------------------------|----------------------------------|--|---|---------------------------------------|----------------|

**Total Number of SVOC/metals Field Samples for Industrial PRG Limits** 15

|                      |
|----------------------|
| <b>Soils-Dioxins</b> |
|----------------------|

|                     |                         |  |   |      |                 |
|---------------------|-------------------------|--|---|------|-----------------|
| East Facility (EF)  | Surface soil 0-6 inches | dioxins (selected locations) (SW 8290) | 4 | BLRA | Industrial PRGs |
| <b>Triangle Lab</b> |                         |  |   |      |                 |

**Total Number of Dioxin Field Samples for Industrial PRG Limits** 4

|                |                         |                      |                  |                                     |         |
|----------------|-------------------------|----------------------|------------------|-------------------------------------|---------|
| Offsite (BKG)  | Surface soil 0-6 inches | Arsenic only (200.7) | <b>Total = 6</b> | Confirm background As concentration | 1 mg/Kg |
| <b>EPA Lab</b> |                         |                      |                  |                                     |         |

|                           |                                  |  |                  |                                       |   |
|---------------------------|----------------------------------|--|------------------|---------------------------------------|---|
| Soil Storage Cells (CELL) | Representative composite samples | TCLP Metals and SVOCs (SW1311/6010B/8270C) | <b>Total = 3</b> | For consideration of disposal options | Toxicity Characteristic (TCLP); PRG (total) |
| <b>EPA Lab</b>            |                                  |  |                  |                                       |   |

|              |
|--------------|
| <b>Water</b> |
|--------------|

|                                  |                        |                                      |                   |                   |                   |
|----------------------------------|------------------------|--------------------------------------|-------------------|-------------------|-------------------|
| Outside barrier wall (GP)        | Groundwater (Geoprobe) | As, Cu, Cr (SW6010B), <b>EPA Lab</b> | <b>Total = 12</b> | Nature and Extent | 10x Tap Water PRG |
| SVOC (OLC03.2)<br><b>CLP Lab</b> |                        |                                      |                   |                   |                   |

**TABLE 1-3 CONTINUED**  
Sampling Objectives  
*Taylor Lumber and Treating*

| <b>Sediment</b> |                        |   |                         |      |                                   |
|-----------------|------------------------|---|-------------------------|------|-----------------------------------|
| River bank (RS) | Sediment 0 to 6 inches | SVOC<br>(OLM04.2)– <b>CLP Lab</b><br><br>Low Level PAH<br>(SW8270C-SIM)– <b>CH2M HILL ASL</b><br><br>Metals (ILM04.1)<br><br><b>CLP Lab</b> | <b>Total =</b><br><br>6 | BLRA | Aquatic Sediment Screening Values |
| River bank (RS) | Sediment 0 to 6 inches | Dioxins<br>(SW8290)–<br><b>Triangle Lab</b>   | <b>Total =</b><br><br>2 | BLRA | Aquatic Sediment Screening Values |

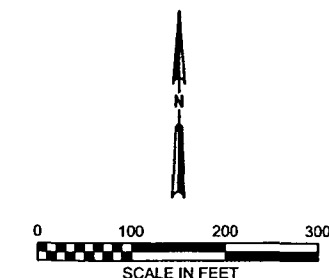
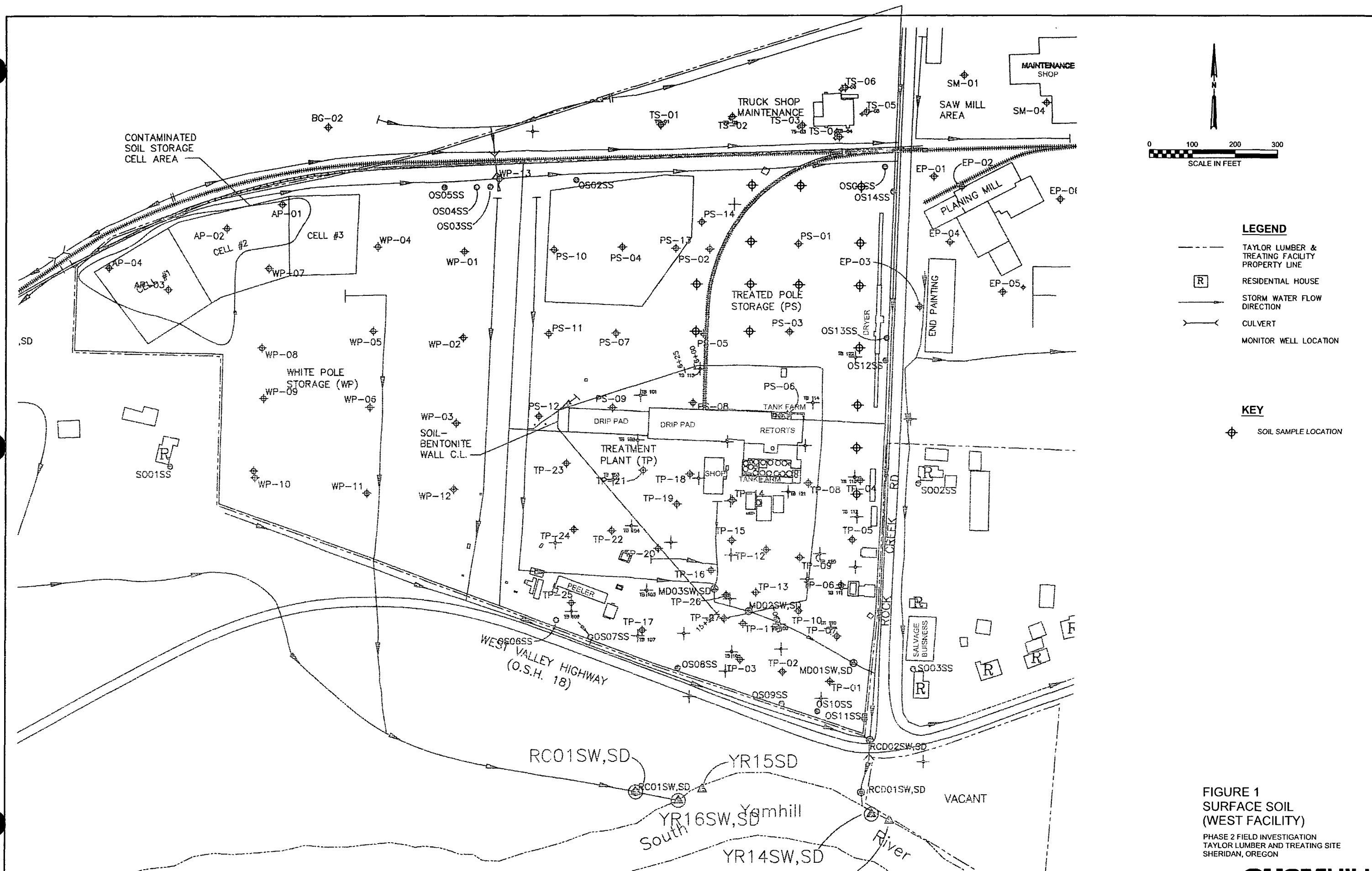
**TABLE 1-4**  
Quality Assessments  
*Taylor Lumber and Treating*

| Assessment Need                  | Purpose  | Performed By  |
|----------------------------------|--|---|
| Review of QAPP                   | Confirm that the proposed sampling and analysis plan meets DQO needs | CH2M HILL PM and EPA Chemist  |
| Review of Lab Data               | Bench/Lab level review to ensure data meets method requirements      | Analytical Laboratory   |
| Review of field data/boring logs | Verifies correct samples taken, procedures followed by field team    | CH2M HILL PM  |
| E-data/Hardcopy Data Review      | Verifies e-data and hardcopy data match                              | CH2M HILL Data Manager  |
| Data Validation                  | Determines whether data meets QA/QC requirements; assesses usability | EPA Chemist for CLP, Manchester Chemist for Manchester, or CH2M HILL Chemist for subcontract labs |
| Reconciliation with DQO's        | Determines whether data meets DQO's for project                      | CH2M HILL Project Team  |

**TABLE 1-5**  
**Quality Control Objectives <sup>1</sup>**  
*Taylor Lumber and Treating*

| Quality Control Parameter | Measurement             | Metals         | SVOCs   | Dioxins/Dibenzofurans   |
|---------------------------|-------------------------|----------------|---|---|
| <b>SOILS/SEDIMENT</b>     |                         |                |   |   |
| Accuracy                  | Field and Method Blanks | < MRL          | < MRL   | < MRL   |
| Accuracy                  | Calibration Checks      | 90% - 110%     | ± 25% D (OLM04.2 Exhibit D, Section 17, Table 5)        | DLM01.4, %D(RR) = ±20%<br>%D(RRF) = ±35%                      |
| Accuracy                  | Target Compound Spikes  | ± 25%          | OLM04.2 Exhibit D, Section 17, Table 6 (Range 11%-142%) | Uses labeled spikes every sample, DLM01.4, Exhibit D, Table 9 |
| Accuracy                  | Surrogate Spikes        | Not applicable | OLM04.2 Exhibit D, Section 17, Table 7                  | Not applicable  |
| Precision                 | Laboratory Duplicates   | ± 20%          | ± 20%   | ± 20%   |
| Precision                 | Field Duplicates        | ± 35%          | ± 35%   | ± 50%   |
| <b>WATER (Geoprobe)</b>   |                         |                |   |   |
| Accuracy                  | Field and Method Blanks | < MRL          | < MRL   | No samples  |
| Accuracy                  | Calibration Checks      | 90% - 110%     | 80% - 120% (PAH)<br>70%-130% (PCP)                      | No samples  |
| Accuracy                  | Target Compound Spikes  | ± 25%          | PAHs 40%-135%<br>PCP 70%-130%                           | No samples  |
| Accuracy                  | Surrogate Spikes        | Not applicable | Per applicable method                                   | No samples  |
| Precision                 | Laboratory Duplicates   | ± 20%          | ± 20%   | No samples  |
| Precision                 | Field Duplicates        | ± 25%          | ± 25%   | No samples  |

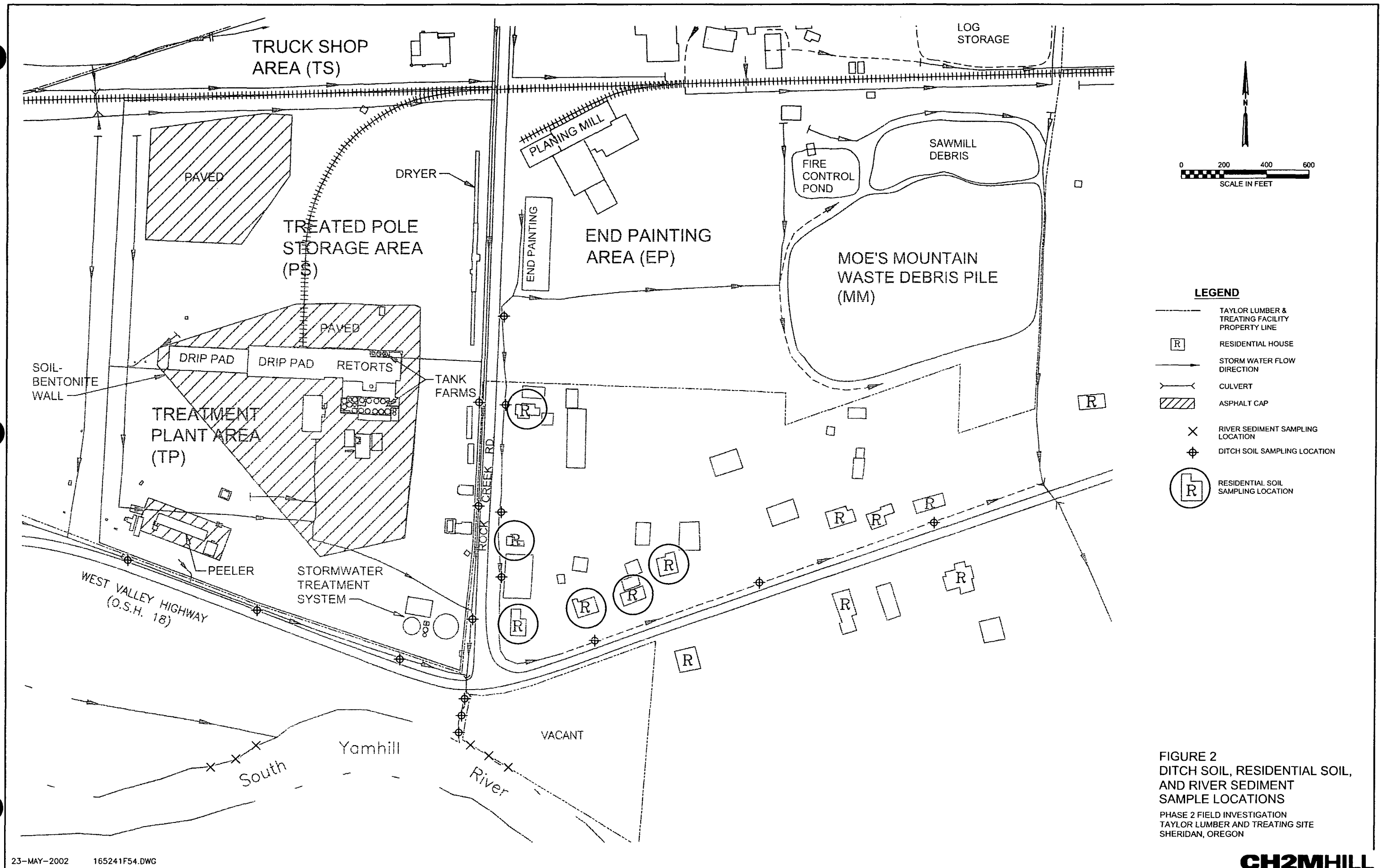
<sup>1</sup> = QC Objectives are based on expected method performance. If method or laboratory criteria are more stringent, then those criteria override those presented in this table.



- LEGEND**
- TAYLOR LUMBER & TREATING FACILITY PROPERTY LINE
  - [R] RESIDENTIAL HOUSE
  - STORM WATER FLOW DIRECTION
  - > CULVERT
  - ⊕ MONITOR WELL LOCATION
- KEY**
- ⊕ SOIL SAMPLE LOCATION

**FIGURE 1**  
**SURFACE SOIL**  
**(WEST FACILITY)**  
 PHASE 2 FIELD INVESTIGATION  
 TAYLOR LUMBER AND TREATING SITE  
 SHERIDAN, OREGON





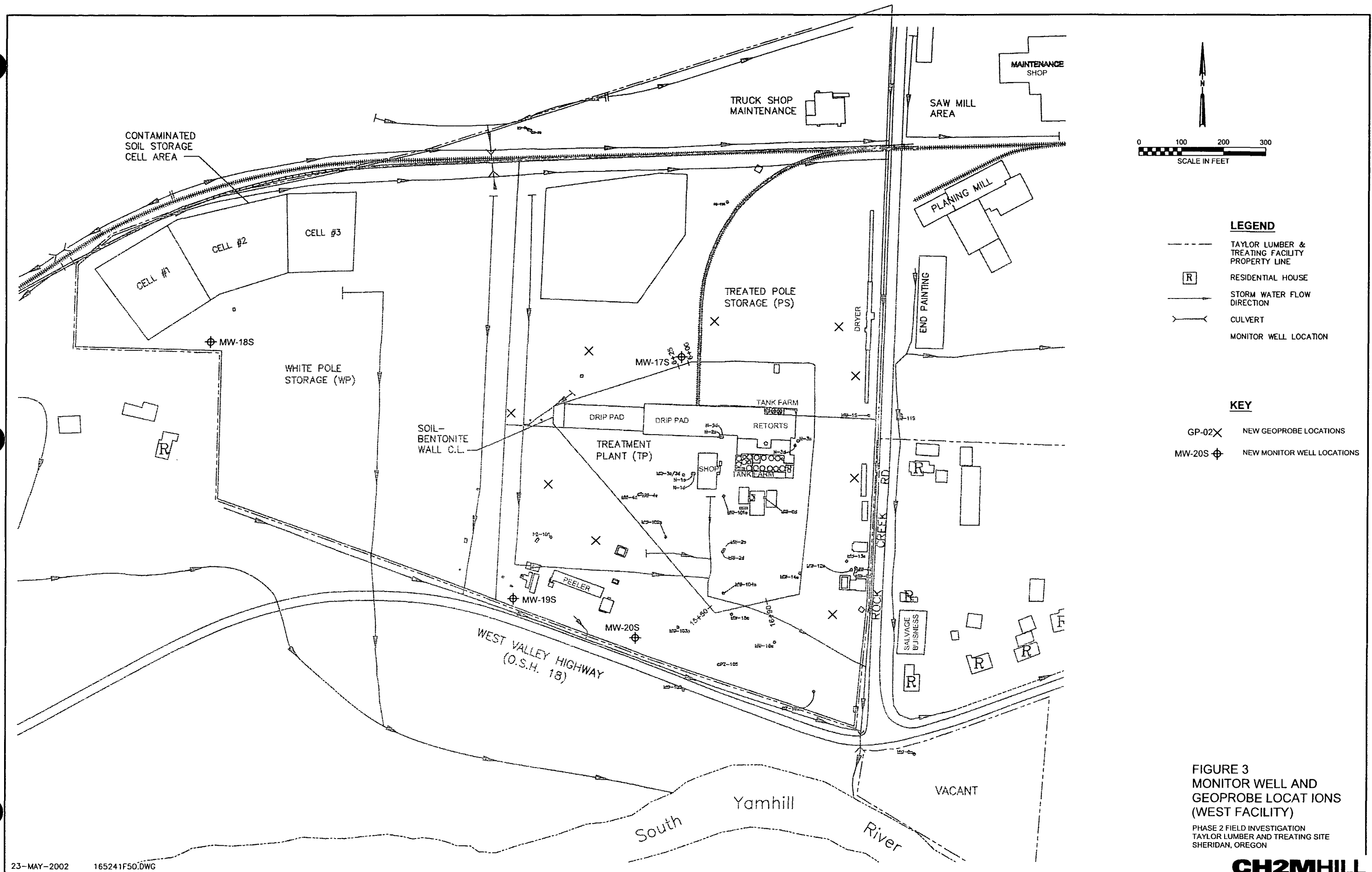




FIGURE 4  
SURFACE SOIL SAMPLES  
AND MONITOR WELL LOCATIONS  
(EAST FACILITY)

PHASE 2 FIELD INVESTIGATION  
TAYLOR LUMBER AND TREATING SITE  
SHERIDAN, OREGON

**CH2MHILL**

## 2.0 Sample Collection and Handling

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This section describes the procedures for sample collection and processing to be performed in support of the Phase 2 Field Investigation activities at the Taylor Lumber and Treating Site.

### 2.1 Sampling Activities

During the Phase 2 Field Investigation event:

- 7 new monitoring wells will be installed; four in the West Facility and 3 in the East Facility.
- Geoprobe will be installed outside the barrier wall and will be used for subsequent groundwater and soil sampling.
- Samples will be taken of the surface soil from the Treated Pole Storage area, West Facility treatment plant area, the East Facility and from 6 nearby residences.
- The soil at on-site and off-site ditches will be sampled at a total of 12 locations.
- A total of 6 sediment samples will be collected from the north bank of the South Yamhill River.

Locations to be sampled and parameters to be analyzed from each are listed in Table 2-1. Sample locations are shown in Figures 1 through 4.

For the water samples obtained from the Geoprobe the volume of water will be limited. In this case the sample containers should be filled in the priority order:

1. SVOCs – collect at least 250-mL if possible
2. Metals – collect at least 50-mL if possible

### 2.2 Sampling Methods

The detailed procedures to be used for the collection of field samples are discussed in the *Phase 2 Field Investigation Work Plan and Standard Operating Procedures for Field Investigations at Taylor Lumber and Treating* (CH2M HILL, May 2002).

#### 2.2.1 Sample Containers, Preservatives and Holding Times

The Field Team Leader (FTL) is responsible for ensuring proper sampling, labeling of samples, preservation, and shipment of samples to the laboratory to meet required holding times. The required sample containers, preservative requirements, and maximum holding times are shown in Table 2-2.

Pre-cleaned and certified sample containers will be purchased and shipped to the field site before sample collection. The FTL will retain all certificates of analysis for the pre-cleaned containers.

### **2.2.2 Decontamination of Field Equipment**

All field meters and probes will be cleaned and rinsed with tap water and deionized water between sample locations and at the end of each sampling event. Decontamination includes a wash in an Alconox detergent solution, a rinse with tap water, and a rinse with deionized water.

### **2.2.3 Sample Disposal / Management of Investigation-Derived Waste**

The laboratory will be responsible for disposing retained samples in accordance with the contract and applicable regulations.

Materials generated during the sampling event will include purged groundwater, used Teflon™ tubing, used groundwater filters, rinsate from equipment decontamination, and used PPE. Purged groundwater and rinsate will be stored in 55-gallon drums until disposal into the onsite Stormwater Treatment System. Used supplies and PPE will be disposed of at the facility waste disposal site.

## **2.2 Sample Handling and Custody Requirements**

Components of sample custody procedures include the use of field logbooks, sample labels, custody seals, and COC forms. Each person involved with sample handling will be trained in COC procedures before the start of the field program. The COC form will accompany the samples during shipment from the field to the laboratory.

The following procedures will be used when transferring the samples for shipment:

### **2.3.1 Field Custody**

The following procedures will be used to document, establish, and maintain custody of field samples:

- Sample labels will be completed for each sample with waterproof ink, making sure that the labels are legible and affixed firmly on the sample container.
- All sample-related information will be recorded in the project logbook.
- The field sampler will retain custody of the samples until they are transferred or properly dispatched.
- To simplify the COC record and minimize potential problems, as few people as possible should handle the samples. For this reason, one individual from the field sampling team will be designated as the responsible individual for all sample transfer activities. This field investigator will be responsible for the care and custody of the samples until they are properly transferred to another person or facility.

- A COC form will accompany all samples. This record documents transfer of custody of samples from the field sampler to the laboratory. When transferring the possession of samples, the individuals relinquishing and receiving will sign, date, and note the time on the record.
- Samples will be properly packaged for shipment and sent to the appropriate laboratory for analysis with a separate signed COC form, enclosed in a plastic bag, and taped inside the cover of each sample box or cooler. The original record will accompany the shipment, and a copy will be retained by the FTL. When samples are relinquished to shipping companies for transport the tracking number will be recorded on the COC form.
- The COC must be signed when relinquished by field personnel and signed by the laboratory receiving the samples.
- Custody seals will be used on the shipping containers when samples are shipped to the laboratory to inhibit sample tampering during transportation.

### 2.3.2 Laboratory Sample Custody

Each laboratory receiving samples for this project must comply with the laboratory sample custody requirements outlined in its Quality Assurance Plan (QAP). The following procedures will be used by the laboratory sample custodian in maintaining the COC once the samples have arrived at the laboratory:

- The laboratory will designate a sample custodian who will be responsible for maintaining custody of the samples and for maintaining all associated records documenting that custody.
- The laboratory will check to see that there has been no tampering with the custody seals on the coolers.
- Upon receipt of the samples, the custodian will check the original COC and request-for-analysis documents and compare them with the labeled contents of each sample container for corrections and traceability. The sample custodian will sign the COC and record the date and time received in the "Received by Laboratory" box.
- The sample custodian also will assign a unique laboratory sample number to each sample.
- Cooler temperature (temperature vial) will be checked and recorded.
- Care will be exercised to annotate any labeling or descriptive errors. If discrepancies occur in the documentation, the laboratory will immediately contact the sample tracking coordinator and project chemist as part of the corrective action process. A qualitative assessment of each sample container will be performed to note anomalies, such as broken or leaking bottles. This assessment will be recorded as part of the incoming COC procedure.
- Samples will be stored in a secured area and at a temperature of  $4^{\circ} \pm 2^{\circ}\text{C}$ , if necessary, until analyses are to begin.

- Copies of the COC and request-for-analysis forms will accompany the laboratory report and will become a permanent part of the project records.

### 2.3.3 Sample Packing and Shipping

During the field effort, the CH2M HILL project chemist will notify the EPA RSSC about shipments to the Manchester Environmental or CLP Laboratories. The CH2m HILL project chemist will contact the subcontract laboratory to inform it about shipments. Hard plastic ice chests or coolers with similar durability will be used for shipping samples. The coolers must be able to withstand a 4-foot drop onto solid concrete in the position most likely to cause damage. Double contain sample bottles in ziplock bags, grouped by sample set. Styrofoam or bubble wrap will be used as packing material to protect the samples from leakage during shipment.

Coolers will be packed with ice, and double bagged in ziplock baggies. A volume of ice approximately equal to sample volume should be present in each cooler. Blue ice will not be used. Ice volume will be recorded in field notebook. After packing is complete, the cooler will be taped securely, with custody seals affixed across the top and bottom joints.

#### Cooler Shipment Notes

1. Include absorbent material in the cooler to absorb any ice melt.
2. Include a temperature blank (DI water in plastic bottle) in each cooler.
3. Record the airbill on each Chain-of-Custody.
4. **Scott Echols should be listed as the contact person on the COC, not Loren McPhillips.**
5. Use custody seals on the cooler.
6. Make sure return address is on the cooler so it can be returned to Corvallis.

Samples will be shipped in accordance with procedures approved by the Department of Transportation for transporting hazardous substances.

#### Please note:

- The contract laboratory must be informed in advance if a Saturday shipment/analysis will be required. Manchester laboratory does not accept samples on Saturday.
- Notify Scott Echols when shipping. He will notify Triangle lab, or Laura Castrilli (who will notify the EPA lab), as appropriate.
- Samples will be shipped priority overnight FedEx to the EPA or contracted laboratory for analysis. On the FedEx slip check "bill sender". The Sender's account number is 2029-5846-0. Using this number will save us approximately 70% on shipping costs. The reference number should be the full project number followed by a slash "/" then the 5 digit employee number. For example: 165241.AN.01/31952.

## 2.4 Laboratory Contacts and Addresses

Samples will be sent to the following laboratories for analyses:

**For TCLP, As in water and As, Cu, Cr in water:**

Manchester Environmental Laboratory  
7411 Beach Drive East  
Port Orchard, WA 98366  
Phone 360-871-8800  
FAX 360-871-8850

Attn: Karen Norton/ESAT  
Sample Shipment Coordinator

**For Low Level PAHs in residential soils and riverbank sediments:**

CH2M HILL Applied Sciences Laboratory  
2300 NW Walnut Blvd.  
Corvallis, OR 97330  
Attn: Dayna Kaumanns

**For all SVOC and metals in soils and sediments, IDW, geoprobe SVOCs (CLP)**

Liberty Analytical  
501 Madison Ave.  
Cary, NC 27513  
Contact Alice Evans  
919-379-4100

**For Dioxins:**

Triangle Laboratories, Inc.  
Attn: Sample Custodian  
2445 S. Alston Ave.  
Durham, NC 27713-1301  
919.544.5729  
FAX: (919) 544-5491



**TABLE 2-1**  
**Sample Locations and Parameters**  
*Taylor Lumber and Treating*

| Sample Location                | Sample Type                | SVOCs |                |                    | Metals    |         |                 | TCLP    |        |      |
|--------------------------------|----------------------------|-------|----------------|--------------------|-----------|---------|-----------------|---------|--------|------|
|                                |                            | BNA   | Low Level PAHs | PCP – part of BNAs | Full List | As only | As, Cr, Cu only | Dioxins | Metals | SVOC |
| Treated pole storage area      | Soil<br>0-2 ft.            | X     |                | X                  | X         |         |                 | X       |        |      |
| Treated pole storage area      | Soil<br>0-6 inches         | X     |                | X                  | X         |         |                 | X       |        |      |
| Onsite/offsite ditches         | Soil<br>0-6 inches         | X     |                | X                  | X         |         |                 | X       |        |      |
| Outside barrier wall           | Groundwater                |       |                | X                  |           |         | X               |         |        |      |
| Outside barrier wall           | Soil                       |       |                | X                  | X         |         |                 |         |        |      |
| Well Installation/<br>Sitewide | Soil                       |       |                | X                  | X         |         |                 |         |        |      |
| Residences                     | Surface Soil<br>0-2 inches | X     | X              | X                  | X         |         |                 | X       |        |      |
| River bank                     | Sediment<br>0-6 inches     | X     | X              | X                  | X         |         |                 | X       |        |      |
| East Facility                  | Surface Soil<br>0-6 inches | X     |                | X                  | X         |         |                 | X       |        |      |
| Offsite                        | Surface Soil<br>0-6 inches |       |                |                    |           | X       |                 |         |        |      |
| Soil Storage Cells             | Composite                  | X     |                | X                  | X         |         |                 | X       | X      | X    |

**TABLE 2-2**  
Required Sample Containers, Preservation, and Holding Times  
*Taylor Lumber and Treating*

| Analyses  | Analytical Method       | Sample Matrix | Container <sup>a</sup> | Qty | Preservative <sup>b</sup>           | Holding Time <sup>c</sup>                           |
|---|-------------------------|---------------|------------------------|-----|-------------------------------------|---|
| <b>Soils/Sediment Bottle Group A – for CLP lab (Liberty Analytical)</b>                   |                         |               |                        |     |                                     |   |
| SVOCs (includes PAHs, PCP, BNA) and Metals  | OLM04.2 and ILM01.4     | Soil/Sediment | 8 oz. Wide-mouth glass | 1   | Cool 4°C                            | 14/40 days-SVOC<br>28 days- Hg<br>6 months - metals |
| <b>Soils/Sediment Bottle Group B – for Triangle Lab</b>                                   |                         |               |                        |     |                                     |   |
| Dioxins/Furans  | DLM01.4 or SW8290       | Soil/Sediment | 8 oz. Wide-mouth glass | 1   | Cool 4°C                            | 14/30 days  |
| <b>Soils/Sediment Bottle Group C – for Low Level PAH – CH2M HILL Applied Sciences Lab</b> |                         |               |                        |     |                                     |   |
| Low Level PAH   | SW8270C-SIM             | Soil/Sediment | 8 oz. Wide-mouthglass  | 1   | Cool 4°C                            | 14/40 days  |
| <b>Soils/Sediment Bottle Group D – for TCLP Analysis Lab</b>                              |                         |               |                        |     |                                     |   |
| TCLP SVOC and Metals  | SW1311/SW8270C/S W6010B | Soil/Sediment | 8 oz. Wide-mouth glass | 2   | Cool 4°C                            | 14 days   |
| <b>Water Bottle Group E – for CLP lab</b>   |                         |               |                        |     |                                     |   |
| SVOC (PAH and PCP only)   | OLC03.2                 | water         | 500-mL amber glass     | 2   | Cool 4°C                            | 7/40 days   |
| <b>Water Bottle Group E – EPA Manchester or CLP lab</b>                                   |                         |               |                        |     |                                     |   |
| Metals (As, Cu, Cr only)  | EPA200.7                | water         | 125-mL poly bottle     | 1   | Cool 4°C, HNO <sub>3</sub> , pH < 2 | 6 months  |

Notes:

<sup>a</sup>Glass containers will be sealed with Teflon®-lined screw caps.

<sup>b</sup>All samples will be stored promptly at 4°C in insulated chest.

<sup>c</sup>days to extraction for water or soil/days for analysis, holding times are from sample collection date.

**NOTE:** geoprobe water sample volume will be limited so 500-mL bottles are proposed for SVOC and 125-mL for metals

Sources: SW-846, third edition, Update III (June 1997), OLM04.2, ILM04.1, DLM01.4, EPA 1311, EPA 515.3, EPA200.7, EPA 200.8, EPA 6010B, EPA8270C, EPA7471.

**TABLE 2-3 (REVISED 7-26-02)**  
**Sample Count Summary**  
*Taylor Lumber and Treating*

| Parameter  | Method      | Field Samples | Field Duplicates | MS/MSD | Equipment Rinse Blanks | Total Number of Samples |
|--|-------------|---------------|------------------|--------|------------------------|-------------------------|
| <b>SOILS</b>                                     |             |               |                  |        |                        |                         |
| SVOCs <sup>1</sup> – Industrial PRG, 10x PRGs    | OLM04.2     | 60            | 6                | 3/3    | 3                      | 75                      |
| Low level PAHs <sup>1</sup> – Residential PRG    | SW8270C-SIM | 12            | 1                | 1/1    | 1                      | 16                      |
| Metals Residential PRG, Industrial PRG, 10x PRGs | ILM04.1     | 60            | 6                | 3/3    | 3                      | 75                      |
| Dioxins  | DLM01.4     | 20            | 2                | 1/1    | 3                      | 27                      |
| Arsenic only                                     | ILM04.1     | 6             | 1                | 1/1    | 2                      | 10                      |
| TCLP SVOC  | 1311/8270C  | 3             | 1                | 0/0    | 0                      | 4                       |
| TCLP Metals                                      | 1311/6010B  | 3             | 1                | 0/0    | 0                      | 4                       |
| <b>SEDIMENT</b>                                  |             |               |                  |        |                        |                         |
| SVOCs <sup>1</sup> – Aquatic Risk Values         | OLM04.2     | 9             | 1                | 1/1    | 1                      | 13                      |
| Low Level PAH <sup>1</sup> – Aquatic Risk Values | SW8270C-SIM | 9             | 1                | 1/1    | 1                      | 13                      |
| Metals   | ILM04.1     | 9             | 1                | 1/1    | 1                      | 13                      |
| Dioxins  | DLM01.4     | 3             | 1                | 1/1    | 1                      | 7                       |
| <b>WATER</b>                                     |             |               |                  |        |                        |                         |
| Metals (As, Cu, Cr)                              | 6010B/6020  | 12            | 1                | 1/1    | 1                      | 16                      |
| SVOCs (PCP and PAH only)                         | SW8270C     | 12            | 1                | 1/1    | 1                      | 16                      |

Note 1 – SVOCs includes PAHs and PCP

## **3.0 Quality Control Requirements**

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### **3.1 Project Quality Control Checks**

Field duplicates, equipment blanks, and matrix spike/matrix spike duplicates (MS/MSDs) will be submitted to the laboratory as part of the field QA/QC program. Trip blanks will not be submitted because none of the samples will be analyzed for VOCs. A brief description and frequency of the QC samples are included in Table 3-1. Where possible, the sample, the sample duplicate, and the MS/MSD sample will be taken from the same sample location.

Laboratory QA/QC procedures are also described in Table 3-1. These include method blanks, laboratory blank spikes, surrogate spikes, and calibration check samples.

Sample coolers, bottles, preservatives and temperature blanks will be provided by CH2M HILL for samples shipped to the Manchester Environmental Laboratory (MEL), CLP or subcontract (e.g. Triangle) laboratories.

### **3.2 Field and Laboratory Corrective Action**

#### **3.2.1 Field Corrective Action**

Any problems encountered in the field should be documented. If general field practices or other standard procedures were deviated from, a corrective action report should be completed, including any measures undertaken to resolve the issue(s). Corrective actions may include:

- correcting COC forms
- changing procedures to correct problems in sample collection, packing, and shipping
- evaluating and amending sampling procedures
- re-sampling

#### **3.2.2 Laboratory Corrective Action**

Details of laboratory corrective actions are described in the appropriate lab QAP.

**TABLE 3-1**  
QA/QC Procedures and Frequency  
Taylor Lumber and Treating

| QC Check                           | Information Provided                        | Description   |
|------------------------------------|---|---|
| <b>Blanks</b>                      |   |   |
| Equipment Rinse Field Blank        | Contamination from total sampling procedure | Samples of reagent grade, analyte free water passed through and over the surface of decontaminated sampling equipment. ERBs are used to monitor the effectiveness of the decontamination process. The rinse water is collected in sample bottles, preserved, and handled in the same manner as the samples. One ERB will be collected for each sampling event or each type of sampling equipment, whichever is more frequent, and analyzed for the same parameters as the corresponding samples.<br><br><u>For this sampling event will collect one from spoon sampling device used for ditches and residences, one from spoon used for east facility and one from sediment sampling device</u> |
| Laboratory Method blank            | Contamination from laboratory procedure     | Samples of reagent water processed through the analytical procedure to monitor lab contamination.<br><br><u>1 per analytical batch of 20 field samples or less</u>  |
| <b>Spikes</b>                      |   |   |
| Matrix spike/ spike duplicate      | Analytical bias due to matrix and method    | Laboratory QC samples designed to monitor the effect of the sample matrix on the accuracy and precision of analytical results. Not required for dioxins/furans analysis as each sample is spiked with a labeled analog.<br><br><u>5% of samples (minimum 1 pair per matrix) – no MS/SD will be collected for dioxins as they are spiked with labeled compounds.</u>   |
| Laboratory blank spike             | Analytical bias due to method               | Laboratory QC samples designed to monitor the effect of the method on the accuracy and precision of analytical results.<br><br><u>1 per analytical batch of 20 field samples or less</u>  |
| Surrogate spike                    | Analytical method bias                      | Compounds added to each organics sample to assess bias of the analytical procedure.<br><br><u>Added to every organic sample (SVOCs)</u>   |
| <b>Calibration Check Samples</b>   |   |   |
| Calibration blank check            | Carryover, memory                           | Analytical system blank   |
| Continuing calibration check       | Calibration drift                           | Assesses calibration accuracy on day of analysis<br><br><u>Daily, per method requirements</u>   |
| Secondary source calibration check | Calibration accuracy                        | Independent check of calibration accuracy<br><br><u>Each type initial calibration is performed</u>  |

**TABLE 3-1**  
**QA/QC Procedures and Frequency**  
*Taylor Lumber and Treating*

| QC Check              | Information Provided                         | Description  |
|-----------------------|--|--|
| <b>Replicates</b>     |  |  |
| Field replicates      | Precision of all steps after sample is taken | <p>"blind" to the laboratory, collected to monitor the precision of the field sampling process. The field team leader will choose at least 10 percent of the total number of sample locations known or suspected to contain moderate contamination as the duplicate field samples. The identity of the duplicate field samples will be recorded in the field-sampling logbook, and this information will be forwarded to the data quality evaluation team to aid in the review and evaluation of the data.</p> <p><u>10% of samples (minimum 1 per matrix)</u></p> |
| Laboratory replicates | Analytical precision                         | Analytical precision   |
| Analysis replicates   | Instrumental precision                       | Instrumental precision (for EPA 245.1 only, not required by other methods)   |

## **4.0 Instrument Maintenance and Calibration**

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### **4.1 Maintenance**

All equipment used for field measurements will be maintained in accordance with the manufacturer's instructions. Routine maintenance and all equipment repairs will be documented in the site logbook. Whenever a piece of equipment fails to operate properly, the instrument either will be repaired in-house if possible, or sent out for repairs, and another instrument equivalent to the original will be substituted, if possible.

Preventive maintenance for laboratory instruments is discussed in greater detail in the laboratory's QAP.

### **4.2 Calibration**

#### **4.2.1 Field Instruments**

Field instruments will be calibrated daily before beginning sampling activities. All field instruments will be calibrated in accordance with the manufacturer's specifications. Standards used to calibrate the field survey instruments will be certified. The method and frequency of calibration for the instruments used for each field activity are described in the manufacturer's instructions and summarized briefly in Table 4-1.

For each instrument, the calibration method, apparatus, standards, and testing frequency should be documented in the field notebook.

#### **4.2.2 Laboratory Equipment**

Laboratory instruments will be calibrated in accordance with the manufacturer's directions and appropriate method requirements. Laboratory instrument calibration procedures will be summarized in the Laboratory QAP will be reviewed and approved by the PM or his designee before samples are submitted to the laboratory.

**TABLE 4-1**  
Instrument Calibration and Frequency  
*Taylor Lumber and Treating*

| Instrument                   | Calibration Activity  | Frequency                           |
|------------------------------|---|-------------------------------------|
| Organic Vapor Analyzer (PID) | Calibrate with zero and span gas according to Health and Safety Plan (HSP) specifications | Beginning of each sampling activity |



## 5.0 Data Management Plan

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The scope of the Data Management Plan (DMP) includes planning, collecting, evaluating, and reporting information gathered during the data collection activity.

### 5.1 Sample Management

The **field team leader** will be responsible for properly labeling each sample. Each label will designate a unique EPA Sample Number (assigned by the EPA RSSC), and a Location ID Number (obtained from the CH2M HILL data manager) that identifies from which well, depth and date the sample was collected. Sample labels and Location ID Numbers are described in the next subsection.

The **field team leader** will also be responsible for sequencing the collection and analysis of the QA/QC samples so those appropriate samples are included in each analytical batch. When applicable, QA/QC samples will be referenced to the associated field sample using the unique Sample ID.

The **field team leader** will be responsible for management and security of the samples while in the field and will be responsible for proper shipment of the samples the laboratory.

#### 5.1.1 The EPA Sample Number

The EPA sample numbers begin with the year (two digits), week in the year (two digits) and then a unique number assigned by EPA. For the July 2002 sample event the assigned EPA Sample Numbers are:

02314400 through 02314499

Project Code: TEC-440J

#### 5.1.2 Location ID Numbers

Groundwater samples will be identified by the well ID, sample or well depth, and the sampling date, such as:

**TTXXXd -\***

- TT = One or two character well type designation, for example, MW
- XX = three-digit well number, for example, MW008
- d = depth specification, either S (shallow – gravel alluvium) or D (deep – siltstone), for example, MW008D
- \* = MS/MSD, if the sample is a matrix spike / matrix spike duplicate

Examples:

**MW010S:** Regular field sample collected from MW-10S, from within the gravel alluvium.

**DUP002:** Second field duplicate sample.

**DUP002-MS/MSD:** Matrix spike / matrix spike duplicate sample collected from the above sample location.

Soil samples will be identified by number and sampling interval. For example:

**SBXXXd -\***

- SB = two character type designation for soils
- XX = three-digit location number, for example, SB001
- d = depth specification, A = first sampling interval (depth) , B = second sampling interval, etc. for example, SB001A
- \* = MS/MSD, if the sample is a matrix spike / matrix spike duplicate

### 5.1.3 Sample Labels

Prior to collection of a particular sample, all the containers needed for the different analyses should be properly labeled. The sample label should be attached directly to the sample container.

The information that should be included on the sample label includes:

- Project name
- Sample ID—unique identification for each sample location
- Date sampled
- Time sampled—in military time
- Initials of sampler(s)
- Analysis for which the particular container is intended
- Preservative in the sample container, if any

## 5.2 Data Management

### 5.2.1 Initial Data Verification

The unique laboratory batch and SampleID will be used for correspondence with the laboratory.

- CLP – The laboratory will deliver the analytical data to the **EPA chemist** in both hard-copy and electronic format with references to each applicable laboratory batch and SampleID.
- Manchester – The laboratory will deliver the analytical data to the **Manchester peer review chemist** in both hard-copy and electronic format with references to each applicable laboratory batch and SampleID.

- Triangle Labs (subcontractors) – The laboratory will deliver the analytical data to the **CH2M HILL chemist** in both hard-copy and electronic format with references to each applicable laboratory batch and SampleID.

The laboratory deliverable will be reviewed by the CH2M HILL Data Manager chemist to verify that the appropriate electronic information matches the hard copy lab reports, and all data can be accounted for.

### 5.2.2 Data Validation

For CLP laboratory generated data, the **EPA QA Officer** will review the electronic database file and supporting hard-copy reports to assess the quality of the data with respect to the project-specific DQOs, as described in the QAPP. Data validation procedures are described in EPA National Functional Guidelines for Data Review (EPA, 1994a, 1994b). Procedures are summarized in Section 7 of this document. The data validation personnel will edit the original hard copy laboratory reports in blue or black pen. Validation modifications are then applied to the electronic database.

For Manchester laboratory generated data, the **Manchester peer review chemist** will review the electronic database file and supporting hard-copy reports to assess the quality of the data with respect to the project-specific DQOs, as described in the QAPP. Data validation procedures are described in EPA National Functional Guidelines for Data Review (EPA, 1994a, 1994b). Procedures are summarized in Section 7 of this document. The data validation personnel will edit the original hard copy laboratory reports in blue or black pen. Validation modifications are then applied to the electronic database.

For data from Triangle Labs, the **CH2M HILL project chemist** will review the electronic database file and supporting hard-copy reports to assess the quality of the data with respect to the project-specific DQOs, as described in the QAPP. Data validation procedures are described in EPA National Functional Guidelines for Data Review (EPA, 1994a, 1994b). Procedures are summarized in Section 7 of this document. The data validation personnel will edit the original hard copy laboratory reports in blue or black pen. Validation modifications are then applied to the electronic database.

### 5.2.3 Data Entry

After the data has been verified and validated the EPA chemist will send it to EPA Project Manager who will provide it to the **CH2M HILL data manager** to load into the Taylor database. Other data from the sampling event will be entered into the database, including water level data and field measurements. Other types of data elements may be added to this list as the project needs and activities evolve.

### 5.2.4 Data Use and Reporting

Once the information in the database is complete and validated, it will be used by various members of the project team to support the technical evaluations regarding site conditions and remediation strategies. The expected data evaluation activities include statistical reduction, nature and extent evaluation, trend analysis, and risk assessment.

All statistical analyses, data listings and analytical reports will be generated from the working database with the assistance of the data manager.

## 6.0 Assessments and Oversight

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Assessment and oversight activities are performed to determine whether the QC measures identified in the work plan and QAPP are being implemented and documented as required. Audits and reviews are the tools to implement this process. For example, during a review the auditor may check that a monitoring well has been correctly sampled or that the field QC samples were collected at the appropriate frequency. During an audit or review, the auditor may check for:

- Adherence to the site-specific plans
- Documentation of the process or system
- Proper identification, resolution, and documentation of nonconformance with the process or system
- Correction of identified deficiencies

### 6.1 Assessments and Response Actions

Although no audits are currently planned for the groundwater monitoring, an audit may, at some time, be recommended by the EPA. Assessment activities may include surveillance, inspection, peer review, management system review, readiness review, technical systems audit, performance evaluation, and data quality assessment. The PM, with assistance from the program chemist, will be responsible for initiating audits, selecting the audit team, and overseeing audit implementation.

Audits of the analytical laboratories will be performed in accordance with the laboratory subcontract. Laboratory audits will be performed by the program chemist or designee in compliance with the subcontract.

Field audits will be conducted by the CH2M HILL project QA manager or designee per the project requirements.

#### 6.1.1 Laboratory Performance and Systems Audits

Laboratory systems will be audited in accordance with program or project requirements. Contracted laboratories must submit a Laboratory QAP. The QAP must include relevant standard operating procedures, a description of the laboratory's internal procurement policies, and its corrective action program.

The laboratory audits will address at least the following issues:

- Is the laboratory operation being performed as required by the subcontract.
- Are internal laboratory operations being conducted in accordance with the laboratory QAP.

- Are the laboratory analyses being performed in accordance with method requirements.

Any nonconformance noted during an audit will result in a corrective action.

### **6.1.2 Field Team Performance and System Audits**

The program chemist or a designated representative will conduct audits of the field activities in accordance with the program requirements. The audit will address at least the following issues:

- Are sampling operations being performed as stated in the site-specific work plan?
- Are the sample labels being filled out completely and accurately?
- Are the COC records complete and accurate?
- Are the field notebooks being filled out completely and accurately?
- Are the sampling activities being conducted in accordance with the site-specific work plan and approved SOPs?
- Are the documents generated in association with the field effort being stored as described in the site-specific work plan?

The generation and documentation of field data will also be audited. The audits will focus on verifying that proper procedures are followed so that subsequent sample data will be valid. Any nonconformance noted during an audit will result in corrective action.

The results of the assessment and oversight activities will be reported back to the PM, who has ultimate responsibility for ensuring that the corrective action response is completed, verified, and documented.

## **6.2 Reports to Client**

Reports to the EPA program managers include project status reports, the results of evaluation and system audits, data quality assessments, and significant QA and recommended solutions. The status reports, submitted in accordance with the requirements of site-specific work plan, will discuss current activities, problems encountered and their resolution, and planned work.

QA reports will be submitted in accordance with the site-specific work plan. QA reports document implementation of the QAPP and the results of the site -specific QA/QC audits. A final QA report must be submitted as part of each project's final report. The topics to be covered are outlined in the site-specific work plan, but each will include at least the following information:

- Identification of nonconformances that required corrective action and resolution of the nonconformance
- Data quality assessment in terms of precision and accuracy and how they affect the usability of the analytical results

- Limitations of the qualified results and a discussion of rejected results
- Discussion of the field and laboratory QA/QC sample results
- Results of external laboratory audits.

## 7.0 Data Review, Validation, and Verification Requirements

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### 7.1 Data Review and Validation

Data review and validation are processes whereby data generated in support of this project are reviewed against the QA/QC requirements. The data are evaluated for precision, accuracy, and completeness against the analytical protocol requirements. Nonconformances or deficiencies that could affect the usability of data are identified as noted. The data validation approach involves a combination of this QAPP, the analytical methods requirements and the EPA's Laboratory Data Validation Functional Guidelines.

#### 7.1.1 Level 1—Field Survey Data

Field instruments used to collect field survey (or bulk measurements such as pH or conductivity) are direct reading, thus making field calculations and subsequent data reduction unnecessary. Field data will be recorded in the site logbooks by appropriately trained field personnel. Field data will include the following:

- Soil or sediment sample location and depth information
- Geoprobe well sample location and sampling depth information
- Instrument identification
- Calibration information (standards used and results)
- Date and time of calibration and sample measurement
- Sample results
- Supporting information if appropriate

Data will be reviewed by the FTL, who is responsible for the collection and verification of all field data while in the field. Recorded data will be accepted or rejected by the FTL before leaving the sampling site. Extreme readings (readings that appear significantly different from other readings at the same site) will be accepted only after the instrument has been checked for malfunction and/or if the readings are verified by retesting.

Field documentation, sample data, instrument calibrations, and QC data will be reviewed by the PM (or a designee) before being included in the project files.

#### 7.1.2 Level 3—Laboratory Analyses

Data will be reviewed following the process outlined in the following U.S. Environmental Protection Agency (EPA) guidance documents for evaluating data:

- *Contract Laboratory Program National Functional Guidelines for Organic Data Review* (EPA, 1994a); and



- *Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (EPA, 1994b).

Sample results that were not within the acceptance limits will be appended with a qualifying flag, which consisted of a single- or double-letter code that indicated a possible problem with the data. The qualifying flags may originate during the data review, validation, and database query processes. They are then included in the data summary tables so that the data is not used indiscriminately.

All metals data will be flagged as estimated if it is below the PQL and above the MDL.

The purpose of the data evaluation process is to assess the effect of the overall field sampling and analytical process on the usability of environmental data collected during Taylor Lumber and Treating Site sampling. Two major data evaluation categories are laboratory performance and matrix interferences. Evaluation of laboratory performance is a compliance check of whether the laboratory analyzed the samples within the analytical method specifications. Evaluation of matrix interferences is subtler and involves the analysis of several types of results, including surrogate spike recoveries, matrix spike recoveries, and duplicate sample results.

## 7.2 Validation and Verification Methods

Data will be reviewed following the process outlined in the following U.S. Environmental Protection Agency (EPA) guidance documents for evaluating data:

- *Contract Laboratory Program National Functional Guidelines for Organic Data Review* (EPA, 1994a); and
- *Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (EPA, 1994b).
- *USEPA Analytical Operations/Data Quality Center (OAC) National Functional Guidelines for Chlorinated Dioxin/Furan Data Review, Draft Final, March 2002.*

The entire data set will be reviewed for trends, such as blank contamination or unacceptable spike recoveries, which would indicate that the data did not meet the project-specific quality objectives.

## 7.3 Reconciliation with Data Quality Objectives

The final activity of the data quality evaluation is to assess whether the data meets the planned DQOs for this project. The final results, as adjusted for the findings of any data validation/data evaluation, will be checked against the DQOs and an assessment will be made as to whether the data is of sufficient quality to support the DQOs. The decision as to data sufficiency may be affected by the overall precision, accuracy, and completeness of the data as demonstrated by the data validation process. If the data are sufficient to achieve project objectives, the PM will release the data and work can proceed. If the data are insufficient, corrective action will be required.

Appendix D-3  
Laboratory Data Validation Reports

## Data Validation Report for Dioxins/Furans analysis of samples from Taylor Lumber and Treating Groundwater Monitoring Site

PREPARED FOR: Trish Larson/CVO  
Robin Strauss/CVO

PREPARED BY: Scott Echols/CVO

DATE: May 13, 2002

Data from the 12 water samples collected from the Taylor Lumber and Treating site were reviewed for quality assurance parameters. All samples were analyzed using EPA Method 1613B by Triangle Laboratories, Inc in Durham, NC.

Data from the following samples were reviewed in this report:

| EPA Sample ID | SDG      | Lab ID     |                                   |
|---------------|----------|------------|-----------------------------------|
| 02074019      | 56694r2  | 319-85-1A  |                                   |
| 02074017      | 56694    | 318-70-9A  |                                   |
| 02074005      | 56694    | 318-70-8A  |                                   |
| 02074001      | 56694    | 318-70-7A  |                                   |
| 02074002      | 56694    | 318-70-6A  |                                   |
| 02074021      | 56694    | 318-70-4A  |                                   |
| 02074020      | 56694    | 318-70-3A  |                                   |
| 02074023      | 56694Ar1 | 318-70-2B  | ** Re-sampling<br>and re-analysis |
| 02074023      | 56694    | 318-70-2A  |                                   |
| 02074024      | 56694    | 318-70-1A  |                                   |
| 02074014      | 56694r1  | 318-70-11B |                                   |
| 02074018      | 56694    | 318-70-10A |                                   |

## DATA QUALIFICATIONS

All data were reviewed against the performance specifications in EPA Method 1613B, the project QAPP and *EPA Region 10 SOP for the Validation of PCDD and PCDF Data* (USEPA Region 10, 1/31/1996, Rev 2.0).

### Holding Time – Acceptable

The samples were collected on 2/12, 2/13, 2/14, 2/15 and 3/5/02. The samples were extracted and analyzed within the technical holding time criteria given in EPA Method 1613B.

### GC/MS Performance Check – Acceptable

All of the GC/MS performance checks met mass resolution, ion abundance ratios, minimum reporting levels, retention time and 2,3,7,8 chromatographic resolution criteria.

### Initial Calibration - Acceptable

The average RF %RSD was less than 20% and the isotopic dilution method was used.

### Continuing Calibration Verification – Acceptable

The ion abundance ratios and compound percent recoveries were acceptable.

### System Performance – Acceptable

The % recovery, ion abundance ratio and relative retention time criteria were met for the OPR samples.

### Method Blanks –

SDG 56694 (applies to samples 00-13, 15-18, 20-24) – No analytes were detected above the reporting limit in the method blank. The laboratory flagged all values that were within 20x of the blank value. All values that are within 5x of the associated blank will be flagged U-BL rather than JB as flagged by the laboratory. Values between 5x and 20x the observed blank values will retain the B flag indicating the possibility that the result is biased high due to lab contamination.

The laboratory suspected that the results from samples 0207014 and 0207019 were due to laboratory contamination. Sample 0207014 was re-extracted and re-analyzed and reported in SDG 56694r1. Sample 0207019 was re-sampled due to lack of sample volume for the re-extraction. The re-sampling/re-extraction data were reported in SDG 56694r2.

TABLE 1. BLANK FLAGGING FOR SDG 56694

| Compound   | CAS #      | Observed Blank Level (pg/L) | Qualifier | Flag as U all detected values below |
|------------|------------|-----------------------------|-----------|-------------------------------------|
| TCDF2378   | 51207-31-9 | Not detected                | U         | NA                                  |
| TCDD2378   | 1746-01-6  | 2.5                         | J         | 12.5                                |
| PECDF23478 | 57117-31-4 | 3.8                         | J         | 19                                  |

| Compound     | CAS #      | Observed Blank Level (pg/L) | Qualifier | Flag as U all detected values below |
|--------------|------------|-----------------------------|-----------|-------------------------------------|
| PECDF12378   | 57117-41-6 | 5.2                         | J         | 26                                  |
| PECDD12378   | 40321-76-4 | 5.6                         | J         | 28                                  |
| OCDF         | 39001-02-0 | 9.4                         | J         | 47                                  |
| OCDD         | 3268-87-9  | 14.6                        | J         | 73                                  |
| HXCDF234678  | 60851-34-5 | 4.4                         | J         | 22                                  |
| HXCDF123789  | 72918-21-9 | 9.1                         | J         | 45.5                                |
| HXCDF123678  | 57117-44-9 | 5.7                         | J         | 28.5                                |
| HXCDF123478  | 70648-26-9 | 5.4                         | J         | 27                                  |
| HXCDD123789  | 19408-74-3 | 6.6                         | J         | 33                                  |
| HXCDD123678  | 57653-85-7 | 5.4                         | J         | 27                                  |
| HXCDD123478  | 39227-28-6 | 5.0                         | J         | 25                                  |
| HPCDF1234789 | 55673-89-7 | 7.2                         | J         | 36                                  |
| HPCDF1234678 | 67562-39-4 | Not detected                | U         | NA                                  |
| HPCDD1234678 | 35822-46-9 | 5.7                         | J         | 28.5                                |

**SDG 56694r1 (Sample 02074014 only)** – HPCDD1234678 and OCDD were detected above the method reporting limit. The laboratory flagged all values that were within 20x of the blank value. All values that are within 5x of the associated blank will be flagged U-BL rather than JB as flagged by the laboratory. Values between 5x and 20x the observed blank values will retain the B flag indicating the possibility that the result is biased high due to lab contamination.

TABLE 2. BLANK FLAGGING FOR SDG 56694R1

| Compound     | CAS #      | Observed Blank Level (pg/L) | Qualifier | Flag as U all detected values below |
|--------------|------------|-----------------------------|-----------|-------------------------------------|
| TCDF2378     | 51207-31-9 | Not detected                | U         | NA                                  |
| TCDD2378     | 1746-01-6  | 0.92                        | J         | 4.6                                 |
| PECDF23478   | 57117-31-4 | Not detected                | U         | NA                                  |
| PECDF12378   | 57117-41-6 | 4.8                         | J         | 24                                  |
| PECDD12378   | 40321-76-4 | Not detected                | U         | NA                                  |
| OCDF         | 39001-02-0 | Not detected                | U         | NA                                  |
| OCDD         | 3268-87-9  | 4170                        |           | 20850                               |
| HXCDF234678  | 60851-34-5 | Not detected                | U         | NA                                  |
| HXCDF123789  | 72918-21-9 | Not detected                | U         | NA                                  |
| HXCDF123678  | 57117-44-9 | 4.2                         | J         | 21                                  |
| HXCDF123478  | 70648-26-9 | 4.4                         | J         | 22                                  |
| HXCDD123789  | 19408-74-3 | Not detected                | U         | NA                                  |
| HXCDD123678  | 57653-85-7 | 5.4                         | J         | 27                                  |
| HXCDD123478  | 39227-28-6 | Not detected                | U         | NA                                  |
| HPCDF1234789 | 55673-89-7 | 4.5                         | J         | 22.5                                |
| HPCDF1234678 | 67562-39-4 | Not detected                | U         | NA                                  |
| HPCDD1234678 | 35822-46-9 | 189                         |           | 945                                 |

**SDG 56694Ar1 (Sample 02074023 10x dilution re-analysis only)** – HPCDD1234678 and OCDD were detected above the method reporting limit (see Table 2 for those values). None

of the analytes detected in this sample were within 5x or 20x of the associated method blank and no flags are applied on this basis.

**SDG 56694r2 (Sample 02074019 only)** – No analytes were detected above the reporting limit in the method blank. The laboratory flagged all values that were within 20x of the blank value. All values that are within 5x of the associated blank will be flagged U-BL rather than JB as flagged by the laboratory. Values between 5x and 20x the observed blank values will retain the B flag indicating the possibility that the result is biased high due to lab contamination.

**TABLE 3. BLANK FLAGGING FOR SDG 56694R2**

| Compound     | CAS #      | Observed Blank Level (pg/L) | Qualifier | Flag as U all detected values below |
|--------------|------------|-----------------------------|-----------|-------------------------------------|
| TCDF2378     | 51207-31-9 | Not detected                | U         | NA                                  |
| TCDD2378     | 1746-01-6  | Not detected                | U         | NA                                  |
| PECDF23478   | 57117-31-4 | 3.8                         | J         | 19                                  |
| PECDF12378   | 57117-41-6 | 5.3                         | J         | 26.5                                |
| PECDD12378   | 40321-76-4 | 3.7                         | J         | 18.5                                |
| OCDF         | 39001-02-0 | 5.7                         | J         | 28.5                                |
| OCDD         | 3268-87-9  | 6.1                         | J         | 30.5                                |
| HXCDF234678  | 60851-34-5 | 3.1                         | J         | 15.5                                |
| HXCDF123789  | 72918-21-9 | 4.5                         | J         | 22.5                                |
| HXCDF123678  | 57117-44-9 | 4.4                         | J         | 22                                  |
| HXCDF123478  | 70648-26-9 | 3.9                         | J         | 19.5                                |
| HXCDD123789  | 19408-74-3 | Not detected                | U         | NA                                  |
| HXCDD123678  | 57653-85-7 | Not detected                | U         | NA                                  |
| HXCDD123478  | 39227-28-6 | 3.9                         | J         | 19.5                                |
| HPCDF1234789 | 55673-89-7 | Not detected                | U         | NA                                  |
| HPCDF1234678 | 67562-39-4 | 2.7                         | J         | 13.5                                |
| HPCDD1234678 | 35822-46-9 | Not detected                | U         | NA                                  |

#### **Recovery of C-13 Labeled Internal Standards – Acceptable**

The recovery of all C-13 labeled isomers were within 25%-150%.

#### **Recovery of Injection Recovery Standards – Acceptable**

The recovery of all injection recovery standards were within 25%-400%.

#### **Re-analysis and Confirmation (Resolution of multiple data points)**

Re-analysis – Sample 02074023 was re-extracted and re-analyzed at a 10x dilution because OCDD was over the calibration range. Report all values except OCDD from the original analysis of this sample which is associated with SDG 56694. Report OCDD only from the 10x dilution re-analysis of the sample (SDG 56694Ar1). There is good agreement between the two analyses.

2,3,7,8-TCDF Confirmation – 2378TCDF was detected in sample 02074014 (7.7 J). This result was not confirmed by another column. The observed ion abundance and relative retention time met criteria. The data is already flagged J and no additional flags are applied.

2378TCDF was detected in sample 02074023. This result was not confirmed by another column and 2378TCDF was reported as not detected by the laboratory. In addition 2378TCDF was not detected in the 10x re-extraction and re-analysis sample. No changes are made to the data and 2378TCDF is reported as not detected.

## Data Usability Report for Dioxins/Furans - Taylor Lumber and Treating 2<sup>nd</sup> Quarter Groundwater Monitoring

PREPARED FOR: Trish Larson/CVO  
Robin Strauss/CVO

PREPARED BY: Scott Echols/CVO

DATE: September 5, 2002

Data from the 9 water samples collected from the Taylor Lumber and Treating site were reviewed for quality assurance parameters to assess its usability. This review is in addition to the QA review conducted by the laboratory prior to releasing the data. All data are usable for the purposes of this project when the flagging applied by the laboratory and additional flags discussed below are taken into consideration.

All samples were analyzed using EPA Method 1613B by Triangle Laboratories, Inc in Durham, NC. Data from the following samples were reviewed in this report:

| SDG   | Lab ID   | Field ID |
|-------|----------|----------|
| 57506 | 326-89-1 | MW-009S  |
| 57506 | 326-89-2 | PZ-101   |
| 57506 | 326-89-3 | MW-10S   |
| 57510 | 326-93-1 | PZ-102   |
| 57510 | 326-92-2 | MW-101S  |
| 57510 | 326-92-3 | RW-001   |
| 57510 | 326-92-4 | MW-006S  |
| 57510 | 326-92-5 | RW-002   |
| 57510 | 326-92-6 | DUP-001  |

### DATA QUALIFICATIONS

All data were reviewed against the performance specifications in EPA Method 1613B, the project QAPP and National Functional Guidelines for Chlorinated Dioxin/Furan Data Review (EPA 540-R-02-003/March 2002).

#### Holding Time – Acceptable

The samples were collected on 5/20, 5/21, 5/22 and 5/23 2002. The samples were extracted and analyzed within the technical holding time criteria given in EPA Method 1613B.

#### GC/MS Performance Check – Acceptable

All of the GC/MS performance checks met mass resolution, ion abundance ratios, minimum reporting levels, retention time and 2,3,7,8-TCDD chromatographic resolution criteria.



**Initial Calibration - Acceptable**

The average RF %RSD was less than 20% and the isotopic dilution method was used for calibration.

**Continuing Calibration Verification – Acceptable**

The ion abundance ratios and compound percent recoveries were acceptable.

**System Performance – Acceptable**

The % recovery, ion abundance ratio and relative retention time criteria were met for the on-going precision and recovery (OPR) samples.

**Method Blanks –**

**SDG 57506** – No analytes were detected above the method reporting limit (RL) in the method blank. The laboratory flagged all values that were within 20x of the blank value. For samples in this SDG all compounds reported in the samples below the method reporting limit that were also present in the blank below the reporting limit are flagged “U” at the reported level in the sample. Values between RL and 20x the observed blank values will retain the B flag indicating the possibility that the result is biased high due to lab contamination.

**TABLE 1.**  
Blank Flagging for SDG 57506

| Sample ID | Analyte         | Concentration (pg/L) | Original Flag | Validation Flag |
|-----------|-----------------|----------------------|---------------|-----------------|
| MW-009S   | OCDD            | 32.5                 | B             | U               |
| MW-009S   | 1,2,3,7,8-PeCDD | 8.6                  | J             | U               |

**SDG 57510** – No analytes were detected above the method reporting limit (RL) in the method blank. The laboratory flagged all values that were within 20x of the blank value. For samples in this SDG all compounds reported in the samples below the method reporting limit that were also present in the blank below the reporting limit are flagged “U” at the reported level in the sample. Values between RL and 20x the observed blank values will retain the B flag indicating the possibility that the result is biased high due to lab contamination.

**TABLE 2.**  
Blank Flagging for SDG 57510

| Sample ID | Analyte | Concentration (pg/L) | Original Flag | Validation Flag |
|-----------|---------|----------------------|---------------|-----------------|
| DUP-001   | OCDD    | 32.9                 | JB            | U               |
| MW-006S   | OCDD    | 36.1                 | JB            | U               |
| PZ-102    | OCDD    | 31                   | JB            | U               |
| RW-001    | OCDD    | 36.2                 | JB            | U               |
| RW-002    | OCDD    | 26.8                 | JB            | U               |

**Recovery of C-13 Labeled Internal Standards – Acceptable**

The recovery of all C-13 labeled isomers were within 25%-150%.

|                    |   |
|--------------------|---|
| Project Name:      | Taylor Lumber   |
| Project Number:    | 165241.AN.01  |
| SDG Batch:         | 57510   |
| Sampling Date(s):  | 5/20 → 5/23 2002 see below for details  |
| Matrix:            | groundwater   |
| Number of Samples: | 6   |
| Sample Field IDs:  | DUP-001 (5/21) PZ-102 (5/23)<br>MW-003 (5/20) RW-001 (5/22)<br>MW-1015 (5/23) RW-002 (5/21) |
| Reviewed by:       | Scott F. Schell   |
| Date:              | 9/5/02  |

## 1.0 Holding Time and Preservation of Samples

Have any of the following holding times been exceeded?

Water, 30 days from sample collection to extraction (7 days for CWA or SWDA samples)

Soil/sediment, 30 days from sample collection to extraction

All samples, 30 days from extraction to analysis

Were the samples correctly preserved?

Water, 4°C in the dark, Chlorine residual (if any) neutralized

Soil/sediment, 4°C in the dark

| Yes                                 | No                       |
|-------------------------------------|--------------------------|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| NA →                                | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/>            | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| NA →                                | <input type="checkbox"/> |

Note: Extraction holding times are listed as recommended. There are no demonstrated maximum holding times associated with CDDs/CDFs in aqueous, solid, semi-solid, tissues, or other sample matrices. If stored in the dark at 0-4°C and preserved as given above (if required), aqueous samples may be stored for up to one year. Similarly, if stored in the dark at <-10°C, solid, semi-solid, multi-phase, and tissue samples may be stored for up to one year. (EPA 1613B)

**ACTION :** If holding times are exceeded, the concentrations are considered to be minimum concentrations and the detected results are flagged with "J" = holding times not met, possible low bias. Results not detected above the MDL are flagged "UJ".

If samples were incorrectly preserved flag the detected results are flagged with "J" = value is an estimate and results not detected above the MDL are flagged "UJ".

If holding times are grossly exceeded or the storage conditions are improper the reviewer may flag data "R" – rejected, unusable for any purpose.

**2.0 System Performance Checks**Mass Calibration and Resolution -----> PFK Resolution  $\geq 10,000$ 

Were the compound pairs in the window defining mixtures determined ?

Is the height of the valley between the 2,3,7,8 isomers and most closely eluting isomer < 25%  
-

ACTION : Failure to meet either the resolution or the retention time window criteria invalidates all calibration or sample data collected during the 12-hour window. Associated data is flagged "R".

Yes No

|   |  |
|---|--|
| ✓ |  |
| ✓ |  |
| ✓ |  |

**3.0 Initial Calibration**ICAL "T" 11/21/02  
"U" 3/7/02

ICAL performed before sample analysis ?

Does the initial calibration curve contain 5 points and were all points used for calibration?

Do the ion abundance ratios in standards for all labeled and unlabeled PCDD and PCDF meet method 1613B requirements (Table 9) ?

Are compounds within the SIM windows and does the absolute RT of  $^{13}\text{C}_{12}$ -1,2,3,4-TCDD exceed 25 minutes on the DB-5 column and 15 minutes on the DB-225 column ?

Were the minimum reporting levels met and do all the labeled and unlabeled compounds in CS1 have a S/N greater than 10 ?

Is the average RR %RSD less than 20% for **isotope dilution** method of calibration ?

Yes No

|   |  |
|---|--|
| ✓ |  |
| ✓ |  |
| ✓ |  |
| ✓ |  |
| ✓ |  |
| ✓ |  |

ACTION : If any of the above requirements are not met then flag all detected results as "J" and all non-detects as "UJ".

**TABLE 9. THEORETICAL ION ABUNDANCE RATIOS AND QC LIMITS**

Method 1613B, October 1994

| Number of Chlorine Atoms | M/Z's Forming Ratio | Theoretical Ratio | Lower QC Limit | Upper QC Limit |
|--------------------------|---------------------|-------------------|----------------|----------------|
| 4 <sup>1</sup>           | M/(M+2)             | 0.77              | 0.65           | 0.89           |
| 5                        | (M+2)/(M+4)         | 1.55              | 1.32           | 1.78           |
| 6                        | (M+2)/(M+4)         | 1.24              | 1.05           | 1.43           |
| 6 <sup>2</sup>           | M/(M+2)             | 0.51              | 0.43           | 0.59           |
| 7                        | (M+2)/(M+4)         | 1.05              | 0.88           | 1.20           |
| 7                        | M/(M+2)             | 0.44              | 0.37           | 0.51           |
| 8                        | (M+2)/(M+4)         | 0.89              | 0.76           | 1.02           |

QC limits represent 15% windows around the theoretical ion abundance ratios.

- Does not apply to Cl37-2,3,7,8-TCDD (cleanup standard).
- Used for  $^{13}\text{C}_{12}$ -HxCDF only
- Used for  $^{13}\text{C}_{12}$ -HpCDF only

3.0 Calibration Verification

VER 4875002  
TB 22617

Do the ion abundance ratios in standards for all labeled and unlabeled PCDD and PCDF meet method 1613B requirements (Table 9) ?

Are compounds within the SIM windows and does the absolute RT of <sup>13</sup>C<sub>12</sub>-1,2,3,4-TCDD exceed 25 minutes on the DB-5 column and 15 minutes on the DB-225 column ?

Are the relative retention times (RRTs) within the ICAL limits ?

Were the minimum reporting levels met and do all the labeled and unlabeled compounds in CS3 have a S/N greater than 10 ?

Is the CV RR %RSD within ± 20% of the mean value from the ICAL for **isotope dilution** method of calibration ?

| Yes | No |
|-----|----|
| ✓   |    |
| ✓   |    |
| ✓   |    |
| ✓   |    |
| ✓   |    |

ACTION : If any of the above requirements are not met then flag all detected results as "J" and all non-detects as "UJ". If the S/N requirements are not met flag all estimated DLs (non-detects) as "R".

4.0 Compound Identification – examined for positive sample results

Are signals for the two exact m/z's present and do they maximize within ± 2 seconds?

Is the S/N ≥ 2.5 for a sample extract or 10 for a calibration standard?

Are the ion abundance ratios from EPA1613B Table 9 within the limits listed below – or within 10% of the most recent CS3 standard?

Are the relative retention time (RRT) ratios from EPA1613B Table 2 within limits?

If the compound was identified as PCDF - is there a signal (with S/N ≥ 2.5) at the same retention time (±2 seconds) in the PCDPE channel – If YES then the PCDF is not confirmed and is flagged with R.

| Yes | No |
|-----|----|
|     |    |
|     |    |
|     |    |
|     |    |
|     |    |

ACTION : Professional judgment is used to determine whether the data are flagged. If any of the signal maximization or RRT identification criteria are not met the results for that isomer should be qualified as "R" because the presence of the isomer cannot be confirmed. If the S/N criteria are not met or the PCDPE S/N is greater than 2.5 then the sample result should be J flagged.

Dup-001 - all yes except PCDF  
mw-0065 - all yes  
mw-1015  
P2-102  
RW-001

### 5.0 Method Blanks

Was a method blank extracted with every 12-hour sample batch at a frequency of 1 in 20 ?

Does the concentration of any analyte exceed the method reporting limit? (Or contract required reporting limit, CRDL) -- except OCDD/OCDF criteria is < 3x RL

Where samples rerun if the method blank did not meet criteria ?

Yes No

|      |   |
|------|---|
| ✓    |   |
|      | ✓ |
| NA → | → |

| Method Blank Result | Sample Result      | Action                    |
|---------------------|--------------------|---------------------------|
| < CRDL              | ND                 | no action                 |
|                     | < CRDL             | Report CRDL with Flag "U" |
|                     | > CRDL             | Professional Judgement    |
| > or = CRDL         | < CRDL             | Report CRDL with Flag "U" |
|                     | > CRDL but < blank | Flag "U" or "J"           |
|                     | > CRDL and > blank | Professional Judgement    |
| Gross Contamination | Positive           | Flag "R", unusable        |

Reported Blank values

PeCDD 1.9  
OCDD 47.2

DUP-001 32.9 OCDD 32.9 U  
MW-006 36.1 OCDD 36.1 U  
PZ-102 31.0 OCDD 31.0 U  
RW-001 36.2 OCDD 36.2 U  
RW-002 26.8 OCDD 26.8 U

### 6.0 Laboratory Control Samples

Was an OPR (on-going precision and recovery) sample that included all analytes analyzed with the sample set?

Does the OPR meet the criteria for %recovery, ion abundance ratio and relative retention times (RRT) ?

Yes No

|   |  |
|---|--|
| ✓ |  |
| ✓ |  |

ACTION : Results for analytes not meeting the OPR criteria are qualified as "J" or "UJ". If the analyte is not recovered the results are qualified as "R".

### 7.0 Second Column Confirmation

Was a positive result for 2,3,7,8-TCDF confirmed on a second column or confirmed after further cleanup and second column analysis?

Yes No

|      |   |
|------|---|
| NA → | → |
|------|---|

The primary column result should be reported and used if the identity is confirmed on a second column. The second column must meet all the criteria listed above (ICAL, CV, RTs, etc.) If the result is not confirmed R flag the data.

### 8.0 Labeled Compound Recoveries

Is the recovery of each C-13 labeled PCDF and PCDD isomer within 25%-150% ?

Is the recovery of <sup>13</sup>C<sub>12</sub>-1,2,3,4-TCDD within 25%-150% ?

Is the recovery of <sup>13</sup>C<sub>12</sub>-1,2,3,7,8,9-HxCDD within 25%-150% ?

Yes No

|   |  |
|---|--|
| ✓ |  |
| ✓ |  |
| ✓ |  |

ACTION : If any C-13 labeled standard is outside the criteria then qualify detected results as "J" and non-detects as "UJ".

Sample examined  
DUP-001  
MW-006  
MW-1015  
PZ-102  
RW-001  
RW-002  
OPR  
TLI Blank

ACTION : There are no method criteria for these recoveries. Professional judgement should be used if these criteria are exceeded. If the labeled standard is outside the criteria then qualify detected results as "J". If the %R is less than 25% qualify non-detects as "UJ" and if the %R is < 10% qualify non-detects as "R".

### 9.0 Project Quality Assurance Samples

Is the Field Duplicate RPD < 35%

Are Equipment Blanks (if applicable) < MRL ?

ACTION : Professional judgment is used to determine whether the data are flagged.

|  | Yes                                 | No                                  |
|--|-------------------------------------|-------------------------------------|
| Is the Field Duplicate RPD < 35%             | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| Are Equipment Blanks (if applicable) < MRL ? | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |

|                    |  |
|--------------------|--|
| Project Name:      | Taylor Lumber  |
| Project Number:    | 165241. AN. 01   |
| SDG Batch:         | 57506  |
| Sampling Date(s):  | MW-0095 (5/21/02) PZ-101 (5/21/02) MW-105 (5/21/02)    |
| Matrix:            | groundwater  |
| Number of Samples: | 3  |
| Sample Field IDs:  | MW-0095 326-89-1<br>PZ-101 326-89-2<br>MW-105 326-89-3 |
| Reviewed by:       | Scott F. Schulz  |
| Date:              | 9-4-02   |

## 1.0 Holding Time and Preservation of Samples

Have any of the following holding times been <sup>met</sup> exceeded?

Water, 30 days from sample collection to extraction (7 days for CWA or SWDA samples)

Soil/sediment, 30 days from sample collection to extraction

All samples, 30 days from extraction to analysis

Were the samples correctly preserved?

Water, 4°C in the dark, Chlorine residual (if any) neutralized

Soil/sediment, 4°C in the dark

| Yes  | No           |
|------|--------------|
| ✓    | X 9/4/02 STE |
| NA → |              |
| ✓    |              |
|      |              |
| ✓    |              |
| NA → |              |

Note: Extraction holding times are listed as recommended. There are no demonstrated maximum holding times associated with CDDs/CDFs in aqueous, solid, semi-solid, tissues, or other sample matrices. If stored in the dark at 0-4°C and preserved as given above (if required), aqueous samples may be stored for up to one year. Similarly, if stored in the dark at <-10°C, solid, semi-solid, multi-phase, and tissue samples may be stored for up to one year. (EPA 1613B)

**ACTION** : If holding times are exceeded, the concentrations are considered to be minimum concentrations and the detected results are flagged with "J" = holding times not met, possible low bias. Results not detected above the MDL are flagged "UJ".

If samples were incorrectly preserved flag the detected results are flagged with "J" = value is an estimate and results not detected above the MDL are flagged "UJ".

If holding times are grossly exceeded or the storage conditions are improper the reviewer may flag data "R" – rejected, unusable for any purpose.

**2.0 System Performance Checks**Mass Calibration and Resolution -----→ PFK Resolution  $\geq 10,000$ 

Were the compound pairs in the window defining mixtures determined ?

Is the height of the valley between the 2,3,7,8 isomers and most closely eluting isomer &lt; 25%

ACTION : Failure to meet either the resolution or the retention time window criteria invalidates all calibration or sample data collected during the 12-hour window. Associated data is flagged "R".

| Yes                                 | No                       |
|-------------------------------------|--------------------------|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |

**3.0 Initial Calibration**

ICAL performed before sample analysis ?

Does the initial calibration curve contain 5 points and were all points used for calibration?

Do the ion abundance ratios in standards for all labeled and unlabeled PCDD and PCDF meet method 1613B requirements (Table 9) ?

Are compounds within the SIM windows and does the absolute RT of  $^{13}\text{C}_{12}$ -1,2,3,4-TCDD exceed 25 minutes on the DB-5 column and 15 minutes on the DB-225 column ?

Were the minimum reporting levels met and do all the labeled and unlabeled compounds in CS1 have a S/N greater than 10 ?

Is the average RR %RSD less than 20% for **isotope dilution** method of calibration ?

| Yes                                 | No                       |
|-------------------------------------|--------------------------|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |

ACTION : If any of the above requirements are not met then flag all detected results as "J" and all non-detects as "UJ".

**TABLE 9. THEORETICAL ION ABUNDANCE RATIOS AND QC LIMITS***Method 1613B, October 1994*

| Number of Chlorine Atoms | M/Z's Forming Ratio | Theoretical Ratio | Lower QC Limit | Upper QC Limit |
|--------------------------|---------------------|-------------------|----------------|----------------|
| 4 <sup>1</sup>           | M/(M+2)             | 0.77              | 0.65           | 0.89           |
| 5                        | (M+2)/(M+4)         | 1.55              | 1.32           | 1.78           |
| 6                        | (M+2)/(M+4)         | 1.24              | 1.05           | 1.43           |
| 6 <sup>2</sup>           | M/(M+2)             | 0.51              | 0.43           | 0.59           |
| 7                        | (M+2)/(M+4)         | 1.05              | 0.88           | 1.20           |
| 7                        | M/(M+2)             | 0.44              | 0.37           | 0.51           |
| 8                        | (M+2)/(M+4)         | 0.89              | 0.76           | 1.02           |

QC limits represent 15% windows around the theoretical ion abundance ratios.

- Does not apply to Cl<sub>17</sub>-2,3,7,8-TCDD (cleanup standard).
- Used for  $^{13}\text{C}_{12}$ -HxCDF only
- Used for  $^{13}\text{C}_{12}$ -HpCDF only



**3.0 Calibration Verification**

Do the ion abundance ratios in standards for all labeled and unlabeled PCDD and PCDF meet method 1613B requirements (Table 9) ?

Are compounds within the SIM windows and does the absolute RT of  $^{13}\text{C}_{12}$ -1,2,3,4-TCDD exceed 25 minutes on the DB-5 column and 15 minutes on the DB-225 column ?

Are the relative retention times (RRTs) within the ICAL limits ?

Were the minimum reporting levels met and do all the labeled and unlabeled compounds in CS3 have a S/N greater than 10 ?

Is the CV RR %RSD within  $\pm 20\%$  of the mean value from the ICAL for **isotope dilution** method of calibration ?

Yes No

|   |  |
|---|--|
| ✓ |  |
| ✓ |  |
| ✓ |  |
| ✓ |  |
| ✓ |  |

**ACTION :** If any of the above requirements are not met then flag all detected results as "J" and all non-detects as "UJ". If the S/N requirements are not met flag all estimated DLs (non-detects) as "R".

**4.0 Compound Identification – examined for positive sample results**

Are signals for the two exact m/z's present and do they maximize within  $\pm 2$  seconds?

Is the S/N  $\geq 2.5$  for a sample extract or 10 for a calibration standard?

Are the ion abundance ratios from EPA1613B Table 9 within the limits listed below – or within 10% of the most recent CS3 standard?

Are the relative retention time (RRT) ratios from EPA1613B Table 2 within limits?

If the compound was identified as PCDF - is there a signal (with S/N  $\geq 2.5$ ) at the same retention time ( $\pm 2$  seconds) in the PCDPE channel – If YES then the PCDF is not confirmed and is flagged with R.

Yes No

|                            |                            |
|----------------------------|----------------------------|
| mw-093<br>mw-105<br>P2-101 |                            |
| ✓                          |                            |
| ✓                          |                            |
| ✓                          |                            |
|                            | mw-093<br>mw-105<br>P2-101 |

TL1 OPR

**ACTION :** Professional judgment is used to determine whether the data are flagged. If any of the signal maximization or RRT identification criteria are not met the results for that isomer should be qualified as "R" because the presence of the isomer cannot be confirmed. If the S/N criteria are not met or the PCDPE S/N is greater than 2.5 then the sample result should be J flagged.

**5.0 Method Blanks**

Was a method blank extracted with every 12-hour sample batch at a frequency of 1 in 20 ?

Does the concentration of any analyte exceed the method reporting limit? (Or contract required reporting limit, CRDL) -- except OCDD/OCDF criteria is < 3x RL

Where samples rerun if the method blank did not meet criteria ?

| Method Blank Result | Sample Result      | Action                    |
|---------------------|--------------------|---------------------------|
| < CRDL              | ND                 | no action                 |
|                     | < CRDL             | Report CRDL with Flag "U" |
|                     | > CRDL             | Professional Judgement 5x |
| > or = CRDL         | < CRDL             | Report CRDL with Flag "U" |
|                     | > CRDL but < blank | Flag "U" or "J"           |
|                     | > CRDL and > blank | Professional Judgement    |
| Gross Contamination | Positive           | Flag "R", unusable        |

| Yes                                 | No                                  |
|-------------------------------------|-------------------------------------|
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| NA                                  |                                     |

Blank  
1,2,3,7,8 - PeCDD 1.9  
OCDD 47.2

RL 9 pg  
mw-0095 100 32.  
OCDD 22.5 u  
1,2,3,7,8 PeCDD 50 u 8.  
mw-105, P2-101  
No analytes detected that were in blank or > 5x

**6.0 Laboratory Control Samples**

Was an OPR (on-going precision and recovery) sample that included all analytes analyzed with the sample set?

Does the OPR meet the criteria for %recovery, ion abundance ratio and relative retention times (RRT) ?

ACTION : Results for analytes not meeting the OPR criteria are qualified as "J" or "UJ". If the analyte is not recovered the results are qualified as "R".

| Yes                                 | No                       |
|-------------------------------------|--------------------------|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |

**7.0 Second Column Confirmation**

Was a positive result for 2,3,7,8-TCDF confirmed on a second column or confirmed after further cleanup and second column analysis?

| Yes | No |
|-----|----|
| NA  |    |

The primary column result should be reported and used if the identity is confirmed on a second column. The second column must meet all the criteria listed above (ICAL, CV, RTs, etc.) If the result is not confirmed R flag the data.

**8.0 Labeled Compound Recoveries**

Is the recovery of each C-13 labeled PCDF and PCDD isomer within 25%-150% ?

Is the recovery of  $^{13}\text{C}_{12}$ -1,2,3,4,-TCDD within 25%-150% ?

Is the recovery of  $^{13}\text{C}_{12}$ -1,2,3,7,8,9-HxCDD within 25%-150% ?

| Yes                         | No |
|-----------------------------|----|
| mw-0095<br>mw-105<br>P2-101 |    |
| mw-0095<br>mw-105<br>P2-101 |    |
| mw-0095<br>mw-105<br>P2-101 |    |

ACTION : If any C-13 labeled standard is outside the criteria then qualify detected results as "J" and non-detects as "UJ".

OK OK  
↓ ↓

ACTION : There are no method criteria for these recoveries. Professional judgement should be used if these criteria are exceeded. If the labeled standard is outside the criteria then qualify detected results as "J". If the %R is less than 25% qualify non-detects as "UJ" and if the %R is < 10% qualify non-detects as "R".

### 9.0 Project Quality Assurance Samples

Is the Field Duplicate RPD < 35%

Are Equipment Blanks (if applicable) < MRL ?

Yes No

|  |  |
|--|--|
|  |  |
|  |  |

ACTION : Professional judgment is used to determine whether the data are flagged.

ICAL

RT window #1 matches  
congal matches

RT window final matches

CS1 → CS6

T121021

1/21/02

cents

samples

|                    |  |
|--------------------|--|
| Project Name:      | Taylor Lumber  |
| Project Number:    | 165241-AN-01   |
| SDG Batch:         | 57506  |
| Sampling Date(s):  | MW-0095 (5/21/02) PZ-101 (5/21/02) MW-105 (5/23/02)    |
| Matrix:            | groundwater  |
| Number of Samples: | 3  |
| Sample Field IDs:  | MW-0095 326-89-1<br>PZ-101 326-89-2<br>MW-105 326-89-3 |
| Reviewed by:       | Scott F. Schuler                                       |
| Date:              | 9-4-02   |

## 1.0 Holding Time and Preservation of Samples

Have any of the following holding times been <sup>met</sup> exceeded?

Water, 30 days from sample collection to extraction (7 days for CWA or SWDA samples)

Soil/sediment, 30 days from sample collection to extraction

All samples, 30 days from extraction to analysis

Were the samples correctly preserved?

Water, 4°C in the dark, Chlorine residual (if any) neutralized

Soil/sediment, 4°C in the dark

| Yes  | No           |
|------|--------------|
| ✓    | X 9-4-02 SFE |
| NA → |              |
| ✓    |              |
|      |              |
| ✓    |              |
| NA → |              |

Note: Extraction holding times are listed as recommended. There are no demonstrated maximum holding times associated with CDDs/CDFs in aqueous, solid, semi-solid, tissues, or other sample matrices. If stored in the dark at 0-4°C and preserved as given above (if required), aqueous samples may be stored for up to one year. Similarly, if stored in the dark at <-10°C, solid, semi-solid, multi-phase, and tissue samples may be stored for up to one year. (EPA 1613B)

**ACTION :** If holding times are exceeded, the concentrations are considered to be minimum concentrations and the detected results are flagged with "J" = holding times not met, possible low bias. Results not detected above the MDL are flagged "UJ".

If samples were incorrectly preserved flag the detected results are flagged with "J" = value is an estimate and results not detected above the MDL are flagged "UJ".

If holding times are grossly exceeded or the storage conditions are improper the reviewer may flag data "R" – rejected, unusable for any purpose.

**2.0 System Performance Checks**Mass Calibration and Resolution -----→ PFK Resolution  $\geq 10,000$ 

Were the compound pairs in the window defining mixtures determined ?

Is the height of the valley between the 2,3,7,8 isomers and most closely eluting isomer &lt; 25%

ACTION : Failure to meet either the resolution or the retention time window criteria invalidates all calibration or sample data collected during the 12-hour window. Associated data is flagged "R".

Yes No

|   |  |
|---|--|
| ✓ |  |
| ✓ |  |
| ✓ |  |

**3.0 Initial Calibration**

ICAL performed before sample analysis ?

Does the initial calibration curve contain 5 points and were all points used for calibration?

Do the ion abundance ratios in standards for all labeled and unlabeled PCDD and PCDF meet method 1613B requirements (Table 9) ?

Are compounds within the SIM windows and does the absolute RT of  $^{13}\text{C}_{12}$ -1,2,3,4-TCDD exceed 25 minutes on the DB-5 column and 15 minutes on the DB-225 column ?

Were the minimum reporting levels met and do all the labeled and unlabeled compounds in CS1 have a S/N greater than 10 ?

Is the average RR %RSD less than 20% for isotope dilution method of calibration ?

Yes No

|   |  |
|---|--|
| ✓ |  |
| ✓ |  |
| ✓ |  |
| ✓ |  |
| ✓ |  |
| ✓ |  |

ACTION : If any of the above requirements are not met then flag all detected results as "J" and all non-detects as "UJ".

**TABLE 9. THEORETICAL ION ABUNDANCE RATIOS AND QC LIMITS**

Method 1613B, October 1994

| Number of Chlorine Atoms | M/Z's Forming Ratio | Theoretical Ratio | Lower QC Limit | Upper QC Limit |
|--------------------------|---------------------|-------------------|----------------|----------------|
| 4 <sup>1</sup>           | M/(M+2)             | 0.77              | 0.65           | 0.89           |
| 5                        | (M+2)/(M+4)         | 1.55              | 1.32           | 1.78           |
| 6                        | (M+2)/(M+4)         | 1.24              | 1.05           | 1.43           |
| 6 <sup>2</sup>           | M/(M+2)             | 0.51              | 0.43           | 0.59           |
| 7                        | (M+2)/(M+4)         | 1.05              | 0.88           | 1.20           |
| 7                        | M/(M+2)             | 0.44              | 0.37           | 0.51           |
| 8                        | (M+2)/(M+4)         | 0.89              | 0.76           | 1.02           |

QC limits represent 15% windows around the theoretical ion abundance ratios.

1. Does not apply to Cl<sub>37</sub>-2,3,7,8-TCDD (cleanup standard).2. Used for  $^{13}\text{C}_{12}$  -HxCDF only3. Used for  $^{13}\text{C}_{12}$  -HpCDF only

**3.0 Calibration Verification**

Do the ion abundance ratios in standards for all labeled and unlabeled PCDD and PCDF meet method 1613B requirements (Table 9) ?

Are compounds within the SIM windows and does the absolute RT of  $^{13}\text{C}_{12}$ -1,2,3,4-TCDD exceed 25 minutes on the DB-5 column and 15 minutes on the DB-225 column ?

Are the relative retention times (RRTs) within the ICAL limits ?

Were the minimum reporting levels met and do all the labeled and unlabeled compounds in CS3 have a S/N greater than 10 ?

Is the CV RR %RSD within  $\pm 20\%$  of the mean value from the ICAL for **isotope dilution** method of calibration ?

Yes No

|   |  |
|---|--|
| ✓ |  |
| ✓ |  |
| ✓ |  |
| ✓ |  |
| ✓ |  |

**ACTION :** If any of the above requirements are not met then flag all detected results as "J" and all non-detects as "UJ". If the S/N requirements are not met flag all estimated DLs (non-detects) as "R".

**4.0 Compound Identification – examined for positive sample results**

Are signals for the two exact m/z's present and do they maximize within  $\pm 2$  seconds?

Is the S/N  $\geq 2.5$  for a sample extract or 10 for a calibration standard?

Are the ion abundance ratios from EPA1613B Table 9 within the limits listed below – or within 10% of the most recent CS3 standard?

Are the relative retention time (RRT) ratios from EPA1613B Table 2 within limits?

If the compound was identified as PCDF - is there a signal (with S/N  $\geq 2.5$ ) at the same retention time ( $\pm 2$  seconds) in the PCDPE channel – If YES then the PCDF is not confirmed and is flagged with R.

Yes No

|                            |                            |
|----------------------------|----------------------------|
| mw-095<br>mw-105<br>PZ-101 |                            |
| ✓                          |                            |
| ✓                          |                            |
| ✓                          |                            |
|                            | mw-095<br>mw-105<br>PZ-101 |

TL1 CPR

**ACTION :** Professional judgment is used to determine whether the data are flagged. If any of the signal maximization or RRT identification criteria are not met the results for that isomer should be qualified as "R" because the presence of the isomer cannot be confirmed. If the S/N criteria are not met or the PCDPE S/N is greater than 2.5 then the sample result should be J flagged.

### 5.0 Method Blanks

Was a method blank extracted with every 12-hour sample batch at a frequency of 1 in 20 ?

Does the concentration of any analyte exceed the method reporting limit? (Or contract required reporting limit, CRDL) -- except OCDD/OCDF criteria is < 3x RL

Where samples rerun if the method blank did not meet criteria ?

| Method Blank Result | Sample Result      | Action                    |
|---------------------|--------------------|---------------------------|
| < CRDL              | ND                 | no action                 |
|                     | < CRDL             | Report CRDL with Flag "U" |
|                     | > CRDL             | Professional Judgement 5x |
| > or = CRDL         | < CRDL             | Report CRDL with Flag "U" |
|                     | > CRDL but < blank | Flag "U" or "J"           |
|                     | > CRDL and > blank | Professional Judgement    |
| Gross Contamination | Positive           | Flag "R", unusable        |

| Yes                                 | No                                  |
|-------------------------------------|-------------------------------------|
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| NA                                  |                                     |

Blank  
1,2,3,7,8 - PeCDD 1.9  
OCDD 47.2  
RL Q PY  
mw0095 100 32.5  
OCDD 22.5 u 8.6  
1,2,3,7,8 PeCDD 50 u  
mw-105, P2-101  
No analytes detected that were in blank or 5x

### 6.0 Laboratory Control Samples

Was an OPR (on-going precision and recovery) sample that included all analytes analyzed with the sample set?

Does the OPR meet the criteria for %recovery, ion abundance ratio and relative retention times (RRT) ?

ACTION : Results for analytes not meeting the OPR criteria are qualified as "J" or "UJ". If the analyte is not recovered the results are qualified as "R".

| Yes                                 | No                       |
|-------------------------------------|--------------------------|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |

### 7.0 Second Column Confirmation

Was a positive result for 2,3,7,8-TCDF confirmed on a second column or confirmed after further cleanup and second column analysis?

| Yes | No |
|-----|----|
| NA  |    |

The primary column result should be reported and used if the identity is confirmed on a second column. The second column must meet all the criteria listed above (ICAL, CV, RTs, etc.) If the result is not confirmed R flag the data.

### 8.0 Labeled Compound Recoveries

Is the recovery of each C-13 labeled PCDF and PCDD isomer within 25%-150% ?

Is the recovery of <sup>13</sup>C<sub>12</sub>-1,2,3,4-TCDD within 25%-150% ?

Is the recovery of <sup>13</sup>C<sub>12</sub>-1,2,3,7,8,9-HxCDD within 25%-150% ?

| Yes                         | No |
|-----------------------------|----|
| mw-0095<br>mw-105<br>P2-101 |    |
| mw-0095<br>mw-105<br>P2-101 |    |
| mw-0095<br>mw-105<br>P2-101 |    |

OPR Blank  
OK OK  
↓ ↓

ACTION : If any C-13 labeled standard is outside the criteria then qualify detected results as "J" and non-detects as "UJ".



**ACTION :** There are no method criteria for these recoveries. Professional judgement should be used if these criteria are exceeded. If the labeled standard is outside the criteria then qualify detected results as "J". If the %R is less than 25% qualify non-detects as "UJ" and if the %R is < 10% qualify non-detects as "R".

**9.0 Project Quality Assurance Samples**

Is the Field Duplicate RPD < 35%

Are Equipment Blanks (if applicable) < MRL ?

**Yes                  No**

|  |  |
|--|--|
|  |  |
|  |  |

**ACTION :** Professional judgment is used to determine whether the data are flagged.

ICAL

RT window H 1 matches  
congal matches

RT window final matches

CS1 → CS6

T121021

1/21/02

date

samples

## Data Usability Report for Dioxins/Furans - Taylor Lumber and Treating 3rd Quarter Groundwater Monitoring

PREPARED FOR: Trish Larson/CVO  
Robin Strauss/CVO

PREPARED BY: Scott Echols/CVO

DATE: November 27, 2002

Data from the 9 water samples collected from the Taylor Lumber and Treating site were reviewed for quality assurance parameters to assess its usability. This review is in addition to the QA review conducted by the laboratory prior to releasing the data. All data are usable for the purposes of this project when the flagging applied by the laboratory and any additional flags discussed below are taken into consideration.

All samples were analyzed using EPA Method 1613B by Triangle Laboratories, Inc in Durham, NC. Data from the following samples were reviewed in this report:

| SDG     | Lab ID    | Field ID |
|---------|-----------|----------|
| 58277   | 334-68-1A | MW-11S   |
| 58277   | 334-67-4A | MW-1S    |
| 58277   | 334-68-5A | MW-7S    |
| 58277   | 334-67-1A | PZ-102   |
| 58277   | 334-68-4A | PZ-101   |
| 58277   | 334-68-2A | RW-01    |
| 58277   | 334-68-3A | RW-02    |
| 58366   | 335-56-3A | DUP05    |
| 58366   | 335-56-7A | MW-20S   |
| 58366   | 335-56-6A | MW-8D    |
| 58366   | 335-56-1A | MW-101S  |
| 58366   | 335-56-4A | MW-6S    |
| 58366   | 335-56-2A | MW-9S    |
| 58366r1 | 335-56-5B | MW-23S   |

### DATA QUALIFICATIONS

All data were reviewed against the performance specifications in EPA Method 1613B, the project QAPP and National Functional Guidelines for Chlorinated Dioxin/Furan Data Review (EPA 540-R-02-003/March 2002).

#### Holding Time – Acceptable

The samples were collected on 8/21, 8/22, 8/26, 8/27, 9/3 and 9/5 2002. The samples were extracted and analyzed within the technical holding time criteria given in EPA Method 1613B.

**GC/MS Performance Check – Acceptable**

All of the GC/MS performance checks met mass resolution, ion abundance ratios, minimum reporting levels, retention time and 2,3,7,8-TCDD chromatographic resolution criteria.

**Initial Calibration - Acceptable**

The average RF %RSD was less than 20% and the isotopic dilution method was used for calibration.

**Continuing Calibration Verification – Acceptable**

The ion abundance ratios and compound percent recoveries were acceptable.

**System Performance – Acceptable**

The % recovery, ion abundance ratio and relative retention time criteria were met for the on-going precision and recovery (OPR) samples.

**Method Blanks –**

**SDGs 58277 and 58366** – No analytes were detected above the method reporting limit (RL) in the method blanks associated with these SDGs. No data are flagged due to blank contamination.

**SDG 58366r1** – 123478-HxCDF was detected (2.1 pg/L) below the RL but above the MDL in the method blank associated with this SDG. Only one sample (MW-23S) is associated with this method blank and 123478-HxCDF was reported as an estimated maximum possible concentration (EMPC due to not meeting ion abundance ratios) of 1.3-pg/L. This result was flagged "B" by the laboratory during their data review process. Since the value is reported as an EMPC lower than the blank result it was the result was retained and the "B" flag preserved as a conservative estimate. If the blank had truly effected this sample it would be expected that the result would be a confirmed dioxin result not an EMPC. 12378-PeCDF (3.8-pg/L), 23478-PeCDF (2.0-pg/L) and 123789-HxCDF (2.1-pg/L) were all reported as EMPC in the method blank. None of these analytes were detected above the MDL in sample MW-23S so there is no effect on the data quality. No additional flags were placed on the data during validation based on the method blank results.

**Recovery of C-13 Labeled Internal Standards – Acceptable**

The recovery of all C-13 labeled isomers were within 25%-150%.

|                    |  |
|--------------------|--|
| Project Name:      | Taylor Lumber  |
| Project Number:    | 165421.AN.01   |
| SDG Batch:         | 58366 + 58366 r1 → added by 8290   |
| Sampling Date(s):  | 9/13, 9/15   |
| Matrix:            | Water Method 8290  |
| Number of Samples: | 7  |
| Sample Field IDs:  | MW 1015, MW 93, DUP 05, MW 65<br>MW 235, MW-80, MW-205<br>MW-23 → re-extracted due to contamination - (58366 r1) |
| Reviewed by:       | <i>[Signature]</i> only sample   |
| Date:              | 26 Sept 2002 MW235 this SDG  |

## 1.0 Holding Time and Preservation of Samples

Have the following holding times been met ?

Water, 30 days from sample collection to extraction (7 days for CWA or SWDA samples)  
 rec'd 9/11/02 extracted 9/13/02  
 Soil/sediment, 30 days from sample collection to extraction  
 analyzed 9/17/02  
 All samples, 30 days from extraction to analysis  
 58366 r1 analyzed 9/20/02  
 a/sa OK

Were the samples correctly preserved ?

Water, 4°C in the dark, Chlorine residual (if any) neutralized

Soil/sediment, 4°C in the dark

| Yes   | No |
|-------|----|
| X     |    |
| N/A → |    |
| X     |    |
| /     | /  |
| X     |    |
| N/A → |    |

Note: Extraction holding times are listed as recommended. There are no demonstrated maximum holding times associated with CDDs/CDFs in aqueous, solid, semi-solid, tissues, or other sample matrices. If stored in the dark at 0-4°C and preserved as given above (if required), aqueous samples may be stored for up to one year. Similarly, if stored in the dark at <-10°C, solid, semi-solid, multi-phase, and tissue samples may be stored for up to one year. (EPA 1613B)

**ACTION :** If holding times are exceeded, the concentrations are considered to be minimum concentrations and the detected results are flagged with "J" = holding times not met, possible low bias. Results not detected above the MDL are flagged "UJ".

If samples were incorrectly preserved flag the detected results are flagged with "J" = value is an estimate and results not detected above the MDL are flagged "UJ".

If holding times are grossly exceeded or the storage conditions are improper the reviewer may flag data "R" – rejected, unusable for any purpose.

**2.0 System Performance Checks**Mass Calibration and Resolution -----> PFK Resolution  $\geq 10,000$ 

Were the compound pairs in the window defining mixtures determined?

Is the height of the valley between the 2,3,7,8 isomers and most closely eluting isomer &lt; 25%?

ACTION : Failure to meet either the resolution or the retention time window criteria invalidates all calibration or sample data collected during the 12-hour window. Associated data is flagged "R".

WDM's not present for end of runs.

Yes No

|   |                               |
|---|-------------------------------|
| X |                               |
| X | ODCC, ODCF<br>WDM not defined |
| X |                               |

**3.0 Initial Calibration**

ICAL performed before sample analysis?

Does the initial calibration curve contain 5 points and were all points used for calibration?

Do the ion abundance ratios in standards for all labeled and unlabeled PCDD and PCDF meet method 1613B requirements (Table 9)?

Are compounds within the SIM windows and does the absolute RT of  $^{13}\text{C}_{12}$ -1,2,3,4-TCDD exceed 25 minutes on the DB-5 column and 15 minutes on the DB-225 column?

Were the minimum reporting levels met and do all the labeled and unlabeled compounds in CS1 have a S/N greater than 10?

Is the average RR %RSD less than 20% for **isotope dilution** method of calibration?

ACTION : If any of the above requirements are not met then flag all detected results as "J" and all non-detects as "UJ".

Yes No

|   |  |
|---|--|
| X |  |
| X |  |
| X |  |
| X |  |
| X |  |
| X |  |

**TABLE 9. THEORETICAL ION ABUNDANCE RATIOS AND QC LIMITS**

Method 1613B, October 1994

| Number of Chlorine Atoms | M/Z's Forming Ratio | Theoretical Ratio | Lower QC Limit | Upper QC Limit |
|--------------------------|---------------------|-------------------|----------------|----------------|
| 4 <sup>1</sup>           | M/(M+2)             | 0.77              | 0.65           | 0.89           |
| 5                        | (M+2)/(M+4)         | 1.55              | 1.32           | 1.78           |
| 6                        | (M+2)/(M+4)         | 1.24              | 1.05           | 1.43           |
| 6 <sup>2</sup>           | M/(M+2)             | 0.51              | 0.43           | 0.59           |
| 7                        | (M+2)/(M+4)         | 1.05              | 0.88           | 1.20           |
| 7                        | M/(M+2)             | 0.44              | 0.37           | 0.51           |
| 8                        | (M+2)/(M+4)         | 0.89              | 0.76           | 1.02           |

QC limits represent 15% windows around the theoretical ion abundance ratios.

1. Does not apply to Cl<sub>37</sub>-2,3,7,8-TCDD (cleanup standard).
2. Used for  $^{13}\text{C}_{12}$ -HxCDF only
3. Used for  $^{13}\text{C}_{12}$ -HpCDF only

### 3.0 Calibration Verification

Do the ion abundance ratios in standards for all labeled and unlabeled PCDD and PCDF meet method 1613B requirements (Table 9) ?

Are compounds within the SIM windows and does the absolute RT of  $^{13}\text{C}_{12}$ -1,2,3,4-TCDD exceed 25 minutes on the DB-5 column and 15 minutes on the DB-225 column ?

Are the relative retention times (RRTs) within the ICAL limits ?

Were the minimum reporting levels met and do all the labeled and unlabeled compounds in CS3 have a S/N greater than 10 ?

Is the CV RR %RSD within  $\pm 20\%$  of the mean value from the ICAL for isotope dilution method of calibration ?

| Yes            | No |
|----------------|----|
| X              |    |
| X              |    |
| X              |    |
| X              |    |
| see below<br>X |    |

87E  
1/9/03

ACTION : If any of the above requirements are not met then flag all detected results as "J" and all non-detects as "UJ". If the S/N requirements are not met flag all estimated DLs (non-detects) as "R".

5024529 9/17/02 CONCAL 10  $^{13}\text{C}_{12}$  - 0000 20 = -25.78  
 4021379 9/17/02  $^{13}\text{C}_{12}$  - 0000 20 = -24.79  
 4021382 9/17/02 1379-TCDD 20 = -20.78  
 5024543 9/18/02  $^{13}\text{C}_{12}$  - 0000 20 = -21.78

OK 30% criteria per 1613B for labeled stds.

### 4.0 Compound Identification - examined for positive sample results

Are signals for the two exact m/z's present and do they maximize within  $\pm 2$  seconds?

Is the S/N  $\geq 2.5$  for a sample extract or 10 for a calibration standard?

Are the ion abundance ratios from EPA1613B Table 9 within the limits listed below - or within 10% of the most recent CS3 standard?

Are the relative retention time (RRT) ratios from EPA1613B Table 2 within limits?

If the compound was identified as PCDF - is there a signal (with S/N  $\geq 2.5$ ) at the same retention time ( $\pm 2$  seconds) in the PCDF channel - If YES then the PCDF is not confirmed and is flagged with R.

| Yes | No |
|-----|----|
| X   |    |
| X   |    |
| X   |    |
| X   |    |

ACTION : Professional judgment is used to determine whether the data are flagged. If any of the signal maximization or RRT identification criteria are not met the results for that isomer should be qualified as "R" because the presence of the isomer cannot be confirmed. If the S/N criteria are not met or the PCDF S/N is greater than 2.5 then the sample result should be J flagged.

158366  
mw 1015

V = low S/N < 10

Total TCDF QX

DuPOS <sup>many</sup> ~~AT~~ ISIDS < 40% range 36.6 - 39.0 Lab

Flagged V indicating no problem w/ quant. No additional flags.

mw 1015

$^{13}\text{C}_{12}$  23478 PeCDF 22.7% VQ - no additional flags

158366 r1 - no Q, V or X flags

### 5.0 Method Blanks

Was a method blank extracted with every 12-hour sample batch at a frequency of 1 in 20 ?

Yes No

|   |   |
|---|---|
| X |   |
|   | X |
| X |   |

Does the concentration of any analyte exceed the method reporting limit? (Or contract required reporting limit, CRDL) -- except OCDD/OCDF criteria is < 3x RL

Where samples rerun if the method blank did not meet criteria ?

| Method Blank Result | Sample Result      | Action                    |
|---------------------|--------------------|---------------------------|
| < CRDL              | ND                 | no action                 |
|                     | < CRDL             | Report CRDL with Flag "U" |
|                     | > CRDL             | Professional Judgement    |
| > or = CRDL         | < CRDL             | Report CRDL with Flag "U" |
|                     | > CRDL but < blank | Flag "U" or "J"           |
|                     | > CRDL and > blank | Professional Judgement    |
| Gross Contamination | Positive           | Flag "R", unusable        |

58277 > no  
58366 blank  
hits

11/27/02  
SZ

58366 r1

TL1 Blank

123478 - HxCDF 2.1 pg/L

12378 - PeCDF EMPC 3.8 pg/L

23478 - PeCDF EMPC 2.0 pg/L

123789 - HxCDF EMPC 2.1 pg/L

→ not detected in smpl. MW-235  
except as 1.3 pg/L R

> none detected

in sample MW-235

No flags applied on blank basis to MW-235

### 6.0 Laboratory Control Samples

Was an OPR (on-going precision and recovery) sample that included all analytes analyzed with the sample set?

Yes No

|   |  |
|---|--|
| X |  |
| X |  |

Does the OPR meet the criteria for %recovery, ion abundance ratio and relative retention times (RRT) ?

ACTION : Results for analytes not meeting the OPR criteria are qualified as "J" or "UJ". If the analyte is not recovered the results are qualified as "R".

### 7.0 Second Column Confirmation

Was a positive result for 2,3,7,8-TCDF confirmed on a second column or confirmed after further cleanup and second column analysis?

Yes No

|     |   |
|-----|---|
| N/A | → |
|-----|---|

The primary column result should be reported and used if the identity is confirmed on a second column. The second column must meet all the criteria listed above (ICAL, CV, RTs, etc.) If the result is not confirmed R flag the data.

### 8.0 Labeled Compound Recoveries

Is the recovery of each C-13 labeled PCDF and PCDD isomer within 25%-150% ?

Yes No

|   |  |
|---|--|
| X |  |
|---|--|



Is the recovery of  $^{13}\text{C}_{12}$ -1,2,3,4,-TCDD within 25%-150% ?

|   |  |
|---|--|
| X |  |
| X |  |

Is the recovery of  $^{13}\text{C}_{12}$ -1,2,3,7,8,9-HxCDD within 25%-150% ?

ACTION : If any C-13 labeled standard is outside the criteria then qualify detected results as "J" and non-detects as "UJ".

ACTION : There are no method criteria for these recoveries. Professional judgement should be used if these criteria are exceeded. If the labeled standard is outside the criteria then qualify detected results as "J". If the %R is less than 25% qualify non-detects as "UJ" and if the %R is < 10% qualify non-detects as "R".

### 9.0 Project Quality Assurance Samples

Is the Field Duplicate RPD < 35%

Are Equipment Blanks (if applicable) < MRL ?

| Yes | No |
|-----|----|
|     |    |
| N/A | ✓  |

ACTION : Professional judgment is used to determine whether the data are flagged.

1.2, 3, 4, 78 - H<sup>x</sup> CDF 2.1

583661

|                    |  |
|--------------------|--|
| Project Name:      | Taylor Lumber  |
| Project Number:    | 165241   |
| SDG Batch:         | 58277  |
| Sampling Date(s):  | 8/21, 8/22, 8/26, 8/27   |
| Matrix:            | Water Reported as 8290 Method 8290   |
| Number of Samples: | 7  |
| Sample Field IDs:  | MW115, RWC1, RWC2, P2101, MW75, P2-102,<br>MW65, DUP01, MW15, MW95, MW-15<br>↓ broken ↓ broken |
| Reviewed by:       | <i>[Signature]</i>   |
| Date:              | 25 Sept 2002   |

## 1.0 Holding Time and Preservation of Samples

Have the following holding times been met ?

Water, 30 days from sample collection to extraction (7 days for CWA or SWDA samples)  
 rec'd 8/29/02 ext'd 8/31/02  
 Soil/sediment, 30 days from sample collection to extraction  
 analyzed 9/7/02  
 All samples, 30 days from extraction to analysis

Were the samples correctly preserved ?

Water, 4°C in the dark, Chlorine residual (if any) neutralized

Soil/sediment, 4°C in the dark

| Yes   | No |
|-------|----|
| X     |    |
| N/A → |    |
| X     |    |
|       |    |
| X     |    |
| N/A → |    |

Note: Extraction holding times are listed as recommended. There are no demonstrated maximum holding times associated with CDDs/CDFs in aqueous, solid, semi-solid, tissues, or other sample matrices. If stored in the dark at 0-4°C and preserved as given above (if required), aqueous samples may be stored for up to one year. Similarly, if stored in the dark at <-10°C, solid, semi-solid, multi-phase, and tissue samples may be stored for up to one year. (EPA 1613B)

**ACTION :** If holding times are exceeded, the concentrations are considered to be minimum concentrations and the detected results are flagged with "J" = holding times not met, possible low bias. Results not detected above the MDL are flagged "UJ".

If samples were incorrectly preserved flag the detected results are flagged with "J" = value is an estimate and results not detected above the MDL are flagged "UJ".

If holding times are grossly exceeded or the storage conditions are improper the reviewer may flag data "R" – rejected, unusable for any purpose.

**2.0 System Performance Checks**Mass Calibration and Resolution -----> PFK Resolution  $\geq 10,000$ 

Were the compound pairs in the window defining mixtures determined ?

Is the height of the valley between the 2,3,7,8 isomers and most closely eluting isomer &lt; 25%

ACTION : Failure to meet either the resolution or the retention time window criteria invalidates all calibration or sample data collected during the 12-hour window. Associated data is flagged "R".

| Yes | No                   |
|-----|----------------------|
| X   |                      |
| X   | No OCDD, OCDF<br>WDM |
| X   |                      |

**3.0 Initial Calibration**

ICAL performed before sample analysis ?

Does the initial calibration curve contain 5 points and were all points used for calibration?

Do the ion abundance ratios in standards for all labeled and unlabeled PCDD and PCDF meet method 1613B requirements (Table 9) ?

Are compounds within the SIM windows and does the absolute RT of  $^{13}\text{C}_{12}$ -1,2,3,4-TCDD exceed 25 minutes on the DB-5 column and 15 minutes on the DB-225 column ?

Were the minimum reporting levels met and do all the labeled and unlabeled compounds in CS1 have a S/N greater than 10 ?

Is the average RR %RSD less than 20% for **isotope dilution** method of calibration ?

| Yes | No |
|-----|----|
| X   |    |
| X   |    |
| X   |    |
| X   |    |
| X   |    |
| X   |    |

ACTION : If any of the above requirements are not met then flag all detected results as "J" and all non-detects as "UJ".

**TABLE 9. THEORETICAL ION ABUNDANCE RATIOS AND QC LIMITS**  
Method 1613B, October 1994

| Number of Chlorine Atoms | M/Z's Forming Ratio | Theoretical Ratio | Lower QC Limit | Upper QC Limit |
|--------------------------|---------------------|-------------------|----------------|----------------|
| 4 <sup>1</sup>           | M/(M+2)             | 0.77              | 0.65           | 0.89           |
| 5                        | (M+2)/(M+4)         | 1.55              | 1.32           | 1.78           |
| 6                        | (M+2)/(M+4)         | 1.24              | 1.05           | 1.43           |
| 6 <sup>2</sup>           | M/(M+2)             | 0.51              | 0.43           | 0.59           |
| 7                        | (M+2)/(M+4)         | 1.05              | 0.88           | 1.20           |
| 7                        | M/(M+2)             | 0.44              | 0.37           | 0.51           |
| 8                        | (M+2)/(M+4)         | 0.89              | 0.76           | 1.02           |

QC limits represent 15% windows around the theoretical ion abundance ratios.

- Does not apply to Cl<sub>17</sub>-2,3,7,8-TCDD (cleanup standard).
- Used for  $^{13}\text{C}_{12}$ -HxCDF only
- Used for  $^{13}\text{C}_{12}$ -HpCDF only

**3.0 Calibration Verification**

Do the ion abundance ratios in standards for all labeled and unlabeled PCDD and PCDF meet method 1613B requirements (Table 9) ?

Are compounds within the SIM windows and does the absolute RT of  $^{13}\text{C}_{12}$ -1,2,3,4-TCDD exceed 25 minutes on the DB-5 column and 15 minutes on the DB-225 column ?

Are the relative retention times (RRTs) within the ICAL limits ?

Were the minimum reporting levels met and do all the labeled and unlabeled compounds in CS3 have a S/N greater than 10 ?

Is the CV RR %RSD within  $\pm 20\%$  of the mean value from the ICAL for **isotope dilution** method of calibration ? *30% Q048*

| Yes | No |
|-----|----|
| X   |    |
| X   |    |
| X   |    |
| X   |    |
| X   |    |

ACTION : If any of the above requirements are not met then flag all detected results as "J" and all non-detects as "UJ". If the S/N requirements are not met flag all estimated DLs (non-detects) as "R".

U133101 9/7/02 CONCAL 10 *de*  
U133214 9/7/02 *de*

**4.0 Compound Identification – examined for positive sample results**

Are signals for the two exact m/z's present and do they maximize within  $\pm 2$  seconds?

Is the S/N  $\geq 2.5$  for a sample extract or 10 for a calibration standard?

Are the ion abundance ratios from EPA1613B Table 9 within the limits listed below – or within 10% of the most recent CS3 standard?

Are the relative retention time (RRT) ratios from EPA1613B Table 2 within limits?

If the compound was identified as PCDF - is there a signal (with S/N  $\geq 2.5$ ) at the same retention time ( $\pm 2$  seconds) in the PCDPE channel – If YES then the PCDF is not confirmed and is flagged with R.

| Yes | No |
|-----|----|
| X   |    |
| X   |    |
| X   |    |
| X   |    |
| X   |    |

ACTION : Professional judgment is used to determine whether the data are flagged. If any of the signal maximization or RRT identification criteria are not met the results for that isomer should be qualified as "R" because the presence of the isomer cannot be confirmed. If the S/N criteria are not met or the PCDPE S/N is greater than 2.5 then the sample result should be J flagged.

None flagged X due to PCDPE coelution.  
No "Q" or "RO" or "V" flags applied to labeled standards.

**5.0 Method Blanks**

Was a method blank extracted with every 12-hour sample batch at a frequency of 1 in 20 ?

Yes

No

|   |   |
|---|---|
| X |   |
|   | X |
| X |   |

Does the concentration of any analyte exceed the method reporting limit? (Or contract required reporting limit, CRDL) -- except OCDD/OCDF criteria is < 3x RL

Where samples rerun if the method blank did not meet criteria ?

| Method Blank Result | Sample Result      | Action                    |
|---------------------|--------------------|---------------------------|
| < CRDL              | ND                 | no action                 |
|                     | < CRDL             | Report CRDL with Flag "U" |
|                     | > CRDL             | Professional Judgement    |
| > or = CRDL         | < CRDL             | Report CRDL with Flag "U" |
|                     | > CRDL but < blank | Flag "U" or "J"           |
|                     | > CRDL and > blank | Professional Judgement    |
| Gross Contamination | Positive           | Flag "R", unusable        |

**6.0 Laboratory Control Samples**

Was an OPR (on-going precision and recovery) sample that included all analytes analyzed with the sample set?

Yes

No

|   |  |
|---|--|
| X |  |
| X |  |

Does the OPR meet the criteria for %recovery, ion abundance ratio and relative retention times (RRT) ?

ACTION : Results for analytes not meeting the OPR criteria are qualified as "J" or "UJ". If the analyte is not recovered the results are qualified as "R".

**7.0 Second Column Confirmation**

Was a positive result for 2,3,7,8-TCDF confirmed on a second column or confirmed after further cleanup and second column analysis?

Yes

No

|     |  |
|-----|--|
| N/A |  |
|-----|--|

The primary column result should be reported and used if the identity is confirmed on a second column. The second column must meet all the criteria listed above (ICAL, CV, RTs, etc.) If the result is not confirmed R flag the data.

**8.0 Labeled Compound Recoveries**

Is the recovery of each C-13 labeled PCDF and PCDD isomer within 25%-150% ?

Yes

No

|   |  |
|---|--|
| X |  |
|---|--|

All recoveries also met  
SW 8290 requirements

40% - 135%  
for SW 8290

Is the recovery of  $^{13}\text{C}_{12}$ -1,2,3,4,-TCDD within 25%-150% ?

|   |  |
|---|--|
| X |  |
| X |  |

Is the recovery of  $^{13}\text{C}_{12}$ -1,2,3,7,8,9-HxCDD within 25%-150% ?

ACTION : If any C-13 labeled standard is outside the criteria then qualify detected results as "J" and non-detects as "UJ".

ACTION : There are no method criteria for these recoveries. Professional judgement should be used if these criteria are exceeded. If the labeled standard is outside the criteria then qualify detected results as "J". If the %R is less than 25% qualify non-detects as "UJ" and if the %R is < 10% qualify non-detects as "R".

### 9.0 Project Quality Assurance Samples

Is the Field Duplicate RPD < 35%

Are Equipment Blanks (if applicable) < MRL ?

| Yes | No                                  |
|-----|-------------------------------------|
| N/A | <input checked="" type="checkbox"/> |
| N/A | <input checked="" type="checkbox"/> |

ACTION : Professional judgment is used to determine whether the data are flagged.

## Data Usability Review Report for Dioxins/Furans - Taylor Lumber and Treating 4th Quarter Groundwater Monitoring

PREPARED FOR: Trish Larson/CVO  
Robin Strauss/CVO

PREPARED BY: Scott Echols/CVO

DATE: January 9, 2003

The data from 19 groundwater samples collected from the Taylor Lumber and Treating site during the 4<sup>th</sup> Quarter groundwater sampling event were reviewed for quality assurance parameters to assess its usability. This review is in addition to the QA review conducted by the laboratory prior to releasing the data. All data are usable for the purposes of this project when the flagging applied by the laboratory and any additional flags discussed below are taken into consideration.

All samples were analyzed using EPA Method 1613B by Triangle Laboratories, Inc in Durham, NC. Data from the following samples were reviewed in this report:

| TABLE 1. SAMPLE CROSS-REFERENCE |          |                  |
|---------------------------------|----------|------------------|
| SDG                             | Lab ID   | Field ID         |
| 59012                           | 342-5-1  | 02474000/MW-001S |
| 59012                           | 342-5-2  | 02474002/MW-006S |
| 59012                           | 342-5-3  | 02474003/MW-006D |
| 59012                           | 342-5-4  | 02474004/MW-007S |
| 59012                           | 342-5-5  | 02474006/MW-009S |
| 59012                           | 342-5-6  | 02474007/MW-010S |
| 59012                           | 342-5-7  | 02474008/MW-011S |
| 59012                           | 342-5-8  | 02474012/MW-015S |
| 59012                           | 342-5-9  | 02474013/MW-016S |
| 59012                           | 342-5-10 | 02474018/MW-021S |
| 59012                           | 342-5-11 | 02474020/MW-023S |
| 59012                           | 342-5-12 | 02474023/MW-104S |
| 59012A                          | 342-5-13 | 02474025/PZ-101  |



| TABLE 1. SAMPLE CROSS-REFERENCE |          |                 |
|---------------------------------|----------|-----------------|
| 59012A                          | 342-5-14 | 02474026/PZ-102 |
| 59012A                          | 342-5-15 | 02474028/PZ-116 |
| 59012A                          | 342-5-16 | 02474030/RW-01  |
| 59012A                          | 342-5-17 | 02474030/RW-02  |
| 59012A                          | 342-5-18 | 02474031/DUP03  |
| 59012A                          | 342-5-19 | 02474032/EW-001 |

One bottle of sample 02474000, both bottles of sample 02474001, and one bottle of 02474002 were broken when received by the laboratory. Therefore, sample 02474001(MW-001S duplicate) was not analyzed.

### DATA QUALIFICATIONS

All data were reviewed against the performance specifications in EPA Method 1613B, the project QAPP and National Functional Guidelines for Chlorinated Dioxin/Furan Data Review (EPA 540-R-02-003/March 2002) .

#### Holding Time – Acceptable

The samples were collected on 11/18/2002 through 11/22/2002. The samples were extracted and analyzed within the technical holding time criteria (30-days @ 4 °C ) given in EPA Method 1613B.

#### GC/MS Performance Check – Acceptable

All of the GC/MS performance checks met mass resolution, ion abundance ratios, minimum reporting levels, retention time and 2,3,7,8-TCDD chromatographic resolution criteria.

#### Initial Calibration - Acceptable

The average RF %RSD was less than 20% and the isotopic dilution method was used for calibration.

#### Continuing Calibration Verification – Acceptable

The ion abundance ratios and compound percent recoveries were acceptable.

#### System Performance – Acceptable

The % recovery, ion abundance ratio and relative retention time criteria were met for the on-going precision and recovery (OPR) sample.

#### Method Blanks –

SDG 59012 – No analytes were detected above the sample specific method detection limit (MDL) in the method blank (file:W197702) associated with this SDG. No data are flagged due to blank contamination.

SDG 59012A– No analytes were detected above the sample specific method detection limit (MDL) in the method blank (file:T026270) associated with this SDG. No data are flagged due to blank contamination.

#### Recovery of C-13 Labeled Internal Standards – Acceptable

The recovery of all C-13 labeled isomers were within 25%-150%. The recovery of all C-13 labeled injection recovery standards were also acceptable and all within 25% to 400%.

#### Field Duplicates

As mentioned above, both sample bottles of the field duplicate for location MW-001S were broken during shipment.

A field duplicate was also taken at location RW-02. No analyte results were reported above the reporting limit in either the native (02474030/RW-02) or replicate sample (02474031/DOP03) from this location. The analytes reported are listed below in Table 2. Because all results were below the RL no flags were applied to the data based on field duplicate results.

**TABLE 2**  
Field Duplicate Results – Detected Results Only

| Analyte       | Native<br>02474030/RW-02 | Duplicate<br>02474031/DOP03 |
|---------------|--------------------------|-----------------------------|
| 1234678-HpCDD | 7.1 J                    | 6.5 J                       |
| OCDD          | 72.1 J                   | Not detected<br>DL=2.4      |
| 123478-HxCDF  | 1.7 J                    | 2.4 J                       |
| 1234678-HpCDF | 2.4 J                    | Not detected<br>DL=2.1      |
| OCDF          | 5.4 J                    | Not detected<br>DL=7.0      |

#### Additional Laboratory Flags

The following flags were applied to the data by the laboratory during review:

J – result is below the method reporting limit, estimated

X – A polychlorinated diphenyl ether (PCDPE) has eluted at the same time as a polychlorinated dibenzofuran (PCDF) and the PCDPE peak intensity is at least 10% of the intensity of the PCDF peak. The result is the maximum concentration of PCDF that could be present and may be biased high by the PCDPE interference.

The following samples have total PCDF concentrations that are affected by PCDPE and should be considered upper estimates of the totals present:

02474000/MW-001S - Total TCDF, PeCDF, HxCDF all qualified as "X" due to PCDPE interference.

02474002/MW-006S - Total HxCDF qualified as "X" due to PCDPE interference.

02474012/MW-015S - Total HxCDF qualified as "X" due to PCDPE interference.

02474023/MW-104S - Total TCDF, PeCDF, HxCDF, HpCDF all qualified as "X" due to PCDPE interference.

02474025/PZ-101 - Total TCDF, PeCDF, HxCDF, HpCDF all qualified as "X" due to PCDPE interference.

02474032/EW-001S - Total HxCDF qualified as "X" due to PCDPE interference.

## Data Usability Review Report for Dioxins/Furans - Taylor Lumber and Treating 4th Quarter Groundwater Monitoring

PREPARED FOR: Trish Larson/CVO  
Robin Strauss/CVO

PREPARED BY: Scott Echols/CVO

DATE: January 9, 2003

The data from 19 groundwater samples collected from the Taylor Lumber and Treating site during the 4<sup>th</sup> Quarter groundwater sampling event were reviewed for quality assurance parameters to assess its usability. This review is in addition to the QA review conducted by the laboratory prior to releasing the data. All data are usable for the purposes of this project when the flagging applied by the laboratory and any additional flags discussed below are taken into consideration.

All samples were analyzed using EPA Method 1613B by Triangle Laboratories, Inc in Durham, NC. Data from the following samples were reviewed in this report:

| TABLE 1. SAMPLE CROSS-REFERENCE |          |                  |
|---------------------------------|----------|------------------|
| SDG                             | Lab ID   | Field ID         |
| 59012                           | 342-5-1  | 02474000/MW-001S |
| 59012                           | 342-5-2  | 02474002/MW-006S |
| 59012                           | 342-5-3  | 02474003/MW-006D |
| 59012                           | 342-5-4  | 02474004/MW-007S |
| 59012                           | 342-5-5  | 02474006/MW-009S |
| 59012                           | 342-5-6  | 02474007/MW-010S |
| 59012                           | 342-5-7  | 02474008/MW-011S |
| 59012                           | 342-5-8  | 02474012/MW-015S |
| 59012                           | 342-5-9  | 02474013/MW-016S |
| 59012                           | 342-5-10 | 02474018/MW-021S |
| 59012                           | 342-5-11 | 02474020/MW-023S |
| 59012                           | 342-5-12 | 02474023/MW-104S |
| 59012A                          | 342-5-13 | 02474025/PZ-101  |

| TABLE 1. SAMPLE CROSS-REFERENCE |          |                 |
|---------------------------------|----------|-----------------|
| 59012A                          | 342-5-14 | 02474026/PZ-102 |
| 59012A                          | 342-5-15 | 02474028/PZ-116 |
| 59012A                          | 342-5-16 | 02474030/RW-01  |
| 59012A                          | 342-5-17 | 02474030/RW-02  |
| 59012A                          | 342-5-18 | 02474031/DUP03  |
| 59012A                          | 342-5-19 | 02474032/EW-001 |

One bottle of sample 02474000, both bottles of sample 02474001, and one bottle of 02474002 were broken when received by the laboratory. Therefore, sample 02474001(MW-001S duplicate) was not analyzed.

### DATA QUALIFICATIONS

All data were reviewed against the performance specifications in EPA Method 1613B, the project QAPP and National Functional Guidelines for Chlorinated Dioxin/Furan Data Review (EPA 540-R-02-003/March 2002) .

#### Holding Time – Acceptable

The samples were collected on 11/18/2002 through 11/22/2002. The samples were extracted and analyzed within the technical holding time criteria (30-days @ 4 °C ) given in EPA Method 1613B.

#### GC/MS Performance Check – Acceptable

All of the GC/MS performance checks met mass resolution, ion abundance ratios, minimum reporting levels, retention time and 2,3,7,8-TCDD chromatographic resolution criteria.

#### Initial Calibration - Acceptable

The average RF %RSD was less than 20% and the isotopic dilution method was used for calibration.

#### Continuing Calibration Verification– Acceptable

The ion abundance ratios and compound percent recoveries were acceptable.

#### System Performance – Acceptable

The % recovery, ion abundance ratio and relative retention time criteria were met for the on-going precision and recovery (OPR) sample.

#### Method Blanks –

SDG 59012 – No analytes were detected above the sample specific method detection limit (MDL) in the method blank (file:W197702) associated with this SDG. No data are flagged due to blank contamination.

SDG 59012A– No analytes were detected above the sample specific method detection limit (MDL) in the method blank (file:T026270) associated with this SDG. No data are flagged due to blank contamination.

#### **Recovery of C-13 Labeled Internal Standards – Acceptable**

The recovery of all C-13 labeled isomers were within 25%-150%. The recovery of all C-13 labeled injection recovery standards were also acceptable and all within 25% to 400%.

#### **Field Duplicates**

As mentioned above, both sample bottles of the field duplicate for location MW-001S were broken during shipment.

A field duplicate was also taken at location RW-02. No analyte results were reported above the reporting limit in either the native (02474030/RW-02) or replicate sample (02474031/DOP03) from this location. The analytes reported are listed below in Table 2. Because all results were below the RL no flags were applied to the data based on field duplicate results.

**TABLE 2**  
Field Duplicate Results – Detected Results Only

| <b>Analyte</b> | <b>Native<br/>02474030/RW-02</b> | <b>Duplicate<br/>02474031/DOP03</b> |
|----------------|----------------------------------|-------------------------------------|
| 1234678-HpCDD  | 7.1 J                            | 6.5 J                               |
| OCDD           | 72.1 J                           | Not detected<br>DL=2.4              |
| 123478-HxCDF   | 1.7 J                            | 2.4 J                               |
| 1234678-HpCDF  | 2.4 J                            | Not detected<br>DL=2.1              |
| OCDF           | 5.4 J                            | Not detected<br>DL=7.0              |

#### **Additional Laboratory Flags**

The following flags were applied to the data by the laboratory during review:

J – result is below the method reporting limit, estimated

X – A polychlorinated diphenyl ether (PCDPE) has eluted at the same time as a polychlorinated dibenzofuran (PCDF) and the PCDPE peak intensity is at least 10% of the intensity of the PCDF peak. The result is the maximum concentration of PCDF that could be present and may be biased high by the PCDPE interference.

The following samples have total PCDF concentrations that are affected by PCDPE and should be considered upper estimates of the totals present:

02474000/MW-001S - Total TCDF, PeCDF, HxCDF all qualified as "X" due to PCDPE interference.

02474002/MW-006S - Total HxCDF qualified as "X" due to PCDPE interference.

02474012/MW-015S - Total HxCDF qualified as "X" due to PCDPE interference.

02474023/MW-104S - Total TCDF, PeCDF, HxCDF, HpCDF all qualified as "X" due to PCDPE interference.

02474025/PZ-101 - Total TCDF, PeCDF, HxCDF, HpCDF all qualified as "X" due to PCDPE interference.

02474032/EW-001S - Total HxCDF qualified as "X" due to PCDPE interference.

|                    |  |
|--------------------|--|
| Project Name:      | Irish Taylor Lumber  |
| Project Number:    | 165241.AN.01   |
| SDG Batch:         | Triangle Labs 59012  |
| Sampling Date(s):  | 11/18/02 → 11/21/02  |
| Matrix:            | groundwater  |
| Number of Samples: | 12   |
| Sample Field IDs:  | 02474000 → 4, 6-8 + 12, Sample 02474001 - not analyzed both jars broke<br>02474012 → 13<br>0247418, 20, 23, 25, 26, 28 → 32 in SDG 59012 A |
| Reviewed by:       | Scott F. Elmer   |
| Date:              | 1-8-03   |

## 1.0 Holding Time and Preservation of Samples

Have the following holding times been met ?

Yes No

All extracted 12/2/02  
within 30-days but  
outside 7-days

Water, 30 days from sample collection to extraction (7  
days for CWA or SWDA samples)

Soil/sediment, 30 days from sample collection to extraction

All samples, 30 days from extraction to analysis

Were the samples correctly preserved ?

Sample 02474001 not analyzed - both bottles received broken

Water, 4°C in the dark, Chlorine residual (if any) neutralized

Soil/sediment, 4°C in the dark

|   |  |
|---|--|
| ✓ |  |
|   |  |
| ✓ |  |
|   |  |
| ✓ |  |
|   |  |

Note: Extraction holding times are listed as recommended. There are no demonstrated maximum holding times associated with CDDs/CDFs in aqueous, solid, semi-solid, tissues, or other sample matrices. If stored in the dark at 0-4°C and preserved as given above (if required), aqueous samples may be stored for up to one year. Similarly, if stored in the dark at <-10°C, solid, semi-solid, multi-phase, and tissue samples may be stored for up to one year. (EPA 1613B)

**ACTION :** If holding times are exceeded, the concentrations are considered to be minimum concentrations and the detected results are flagged with "J" = holding times not met, possible low bias. Results not detected above the MDL are flagged "UJ".

If samples were incorrectly preserved flag the detected results are flagged with "J" = value is an estimate and results not detected above the MDL are flagged "UJ".

If holding times are grossly exceeded or the storage conditions are improper the reviewer may flag data "R" – rejected, unusable for any purpose.



**2.0 System Performance Checks**Mass Calibration and Resolution -----→ PFK Resolution  $\geq 10,000$ 

Were the compound pairs in the window defining mixtures determined ?

Is the height of the valley between the 2,3,7,8 isomers and most closely eluting isomer &lt; 25%?

ACTION : Failure to meet either the resolution or the retention time window criteria invalidates all calibration or sample data collected during the 12-hour window. Associated data is flagged "R".

| Yes                                 | No                       |
|-------------------------------------|--------------------------|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |

**3.0 Initial Calibration**

ICAL performed before sample analysis ?

Does the initial calibration curve contain 5 points and were all points used for calibration?

Do the ion abundance ratios in standards for all labeled and unlabeled PCDD and PCDF meet method 1613B requirements (Table 9) ?

Are compounds within the SIM windows and does the absolute RT of  $^{13}\text{C}_{12}$ -1,2,3,4-TCDD exceed 25 minutes on the DB-5 column and 15 minutes on the DB-225 column ?

Were the minimum reporting levels met and do all the labeled and unlabeled compounds in CS1 have a S/N greater than 10 ?

Is the average RR %RSD less than 20% for **isotope dilution** method of calibration ?

| Yes                                 | No                       |
|-------------------------------------|--------------------------|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |

ACTION : If any of the above requirements are not met then flag all detected results as "J" and all non-detects as "UJ".

**TABLE 9. THEORETICAL ION ABUNDANCE RATIOS AND QC LIMITS**

Method 1613B, October 1994

| Number of Chlorine Atoms | M/Z's Forming Ratio | Theoretical Ratio | Lower QC Limit | Upper QC Limit |
|--------------------------|---------------------|-------------------|----------------|----------------|
| 4 <sup>1</sup>           | M/(M+2)             | 0.77              | 0.65           | 0.89           |
| 5                        | (M+2)/(M+4)         | 1.55              | 1.32           | 1.78           |
| 6                        | (M+2)/(M+4)         | 1.24              | 1.05           | 1.43           |
| 6 <sup>2</sup>           | M/(M+2)             | 0.51              | 0.43           | 0.59           |
| 7                        | (M+2)/(M+4)         | 1.05              | 0.88           | 1.20           |
| 7                        | M/(M+2)             | 0.44              | 0.37           | 0.51           |
| 8                        | (M+2)/(M+4)         | 0.89              | 0.76           | 1.02           |

QC limits represent 15% windows around the theoretical ion abundance ratios.

1. Does not apply to Cl37-2,3,7,8-TCDD (cleanup standard).

2. Used for  $^{13}\text{C}_{12}$  -HxCDF only3. Used for  $^{13}\text{C}_{12}$  -HpCDF only

VER WB 21975 12/3/02 DB-5

### 3.0 Calibration Verification

Do the ion abundance ratios in standards for all labeled and unlabeled PCDD and PCDF meet method 1613B requirements (Table 9) ?

Are compounds within the SIM windows and does the absolute RT of  $^{13}\text{C}_{12}$ -1,2,3,4-TCDD exceed 25 minutes on the DB-5 column and 15 minutes on the DB-225 column ?

Are the relative retention times (RRTs) within the ICAL limits ? All within SIM windows

Were the minimum reporting levels met and do all the labeled and unlabeled compounds in CS3 have a S/N greater than 10 ?

Is the CV RR %RSD within  $\pm 20\%$  of the mean value from the ICAL for isotope dilution method of calibration ? %D all  $< 20\%$  for targets

| Yes                                 | No                       |
|-------------------------------------|--------------------------|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/>            | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/>            | <input type="checkbox"/> |

ACTION : If any of the above requirements are not met then flag all detected results as "J" and all non-detects as "UJ". If the S/N requirements are not met flag all estimated DLs (non-detects) as "R".

%D = +326% for  $^{13}\text{C}_{12}$ -PeCDD 123 this is within EPA 1613 criteria for VER in flags

### 4.0 Compound Identification – examined for positive sample results

Are signals for the two exact m/z's present and do they maximize within  $\pm 2$  seconds?

Is the S/N  $\geq 2.5$  for a sample extract or 10 for a calibration standard?

Are the ion abundance ratios from EPA1613B Table 9 within the limits listed below – or within 10% of the most recent CS3 standard?

Are the relative retention time (RRT) ratios from EPA1613B Table 2 within limits?

If the compound was identified as PCDF - is there a signal (with S/N  $\geq 2.5$ ) at the same retention time ( $\pm 2$  seconds) in the PCDF channel – If YES then the PCDF is not confirmed and is flagged with R.

| Yes  | No                       |
|--|--------------------------|
| by lab <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| by lab <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| by lab <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| by lab <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| none                                       | flagged R                |

ACTION : Professional judgment is used to determine whether the data are flagged. If any of the signal maximization or RRT identification criteria are not met the results for that isomer should be qualified as "R" because the presence of the isomer cannot be confirmed. If the S/N criteria are not met or the PCDF S/N is greater than 2.5 then the sample result should be J flagged.

0247000 Total TCDF, PeCDF, HxCDF all "X" due to DPE  
 0247002 Total HxCDF "X" due to DPE  
 0247012 Total HxCDF "X" due to DPE  
 0247023 Total TCDF, PeCDF, HxCDF, HpCDF all "X" due to DPE

**5.0 Method Blanks**

Was a method blank extracted with every 12-hour sample batch at a frequency of 1 in 20 ?

Yes

No

✓

Does the concentration of any analyte exceed the method reporting limit? (Or contract required reporting limit, CRDL) -- except OCDD/OCDF criteria is < 3x RL

✓

Where samples rerun if the method blank did not meet criteria ?

NA →

| Method Blank Result | Sample Result      | Action                    |
|---------------------|--------------------|---------------------------|
| < CRDL              | ND                 | no action                 |
|                     | < CRDL             | Report CRDL with Flag "U" |
|                     | > CRDL             | Professional Judgement    |
| > or = CRDL         | < CRDL             | Report CRDL with Flag "U" |
|                     | > CRDL but < blank | Flag "U" or "J"           |
|                     | > CRDL and > blank | Professional Judgement    |
| Gross Contamination | Positive           | Flag "R", unusable        |

No detects in method blank W197702

**6.0 Laboratory Control Samples**

Was an OPR (on-going precision and recovery) sample that included all analytes analyzed with the sample set?

Yes

No

✓

Does the OPR meet the criteria for %recovery, ion abundance ratio and relative retention times (RRT) ?

✓

ACTION : Results for analytes not meeting the OPR criteria are qualified as "J" or "UJ". If the analyte is not recovered the results are qualified as "R".

**7.0 Second Column Confirmation**

Was a positive result for 2,3,7,8-TCDF confirmed on a second column or confirmed after further cleanup and second column analysis?

Yes

No

The primary column result should be reported and used if the identity is confirmed on a second column. The second column must meet all the criteria listed above (ICAL, CV, RTs, etc.) If the result is not confirmed R flag the data.

**8.0 Labeled Compound Recoveries**

Is the recovery of each C-13 labeled PCDF and PCDD isomer within 25%-150% ?

Yes

No

✓

Is the recovery of  $^{13}\text{C}_{12}$ -1,2,3,4,-TCDD within 25%-150% ?

Is the recovery of  $^{13}\text{C}_{12}$ -1,2,3,7,8,9-HxCDD within 25%-150% ?

|   |  |
|---|--|
| ✓ |  |
| ✓ |  |

ACTION : If any C-13 labeled standard is outside the criteria then qualify detected results as "J" and non-detects as "UJ".

ACTION : There are no method criteria for these recoveries. Professional judgement should be used if these criteria are exceeded. If the labeled standard is outside the criteria then qualify detected results as "J". If the %R is less than 25% qualify non-detects as "UJ" and if the %R is < 10% qualify non-detects as "R".

### 9.0 Project Quality Assurance Samples

Is the Field Duplicate RPD < 35%

Are Equipment Blanks (if applicable) < MRL ?

Yes No

|  |  |
|--|--|
|  |  |
|  |  |

ACTION : Professional judgment is used to determine whether the data are flagged.

Field Dup = mw-0015 02474000  
Dup01 02474001

Equipment Blank

DB-5 6/14/02 WF5614B  
ICAL Rec. Std. Areas

DB-5 6/12/02 TF5612B  
ICAL Rec. Std. Areas

|      | 1234 TCDD              | 789 HxCDD              | 1234 TCDD | 789 HxCDD |
|------|------------------------|------------------------|-----------|-----------|
| CS1  | 34595                  | 33405                  | 687       | 460       |
| ↓    | 29071                  | 28374                  | 662       | 421       |
|      | <del>28670</del> 29348 | <del>26509</del> 19024 | 1269      | 946       |
|      | <del>30658</del> 28670 | <del>24236</del> 26509 | 1207      | 945       |
| CS5  | <del>26539</del> 30658 | <del>25168</del> 24236 | 1129      | 982       |
| CS6  | 26539                  | 25168                  | 915       | 786       |
| Mean | 29814                  | 26119                  | 978       | 757       |

Additional Lab Flags

J = below RL

X = DPE present

|                    |                                  |
|--------------------|----------------------------------|
| Project Name:      | Taylor Lumber                    |
| Project Number:    | 165241. AN.01                    |
| SDG Batch:         | Triangle Labs 59012A             |
| Sampling Date(s):  | groundwater collected            |
| Matrix:            | 11/18 → 11/22                    |
| Number of Samples: | 7                                |
| Sample Field IDs:  | 02474025, 26, 28, 29, 30, 31, 32 |
| Reviewed by:       | Scott Echels                     |
| Date:              | 1-8-03                           |

## 1.0 Holding Time and Preservation of Samples

Have the following holding times been met ?

All extracted  
within 30 daysWater, 30 days from sample collection to extraction (7  
days for CWA or SWDA samples)

Soil/sediment, 30 days from sample collection to extraction

All samples, 30 days from extraction to analysis

Were the samples correctly preserved ?

Water, 4°C in the dark, Chlorine residual (if any) neutralized

Soil/sediment, 4°C in the dark

| Yes                                 | No                       |
|-------------------------------------|--------------------------|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/>            | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/>            | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/>            | <input type="checkbox"/> |

Note: Extraction holding times are listed as recommended. There are no demonstrated maximum holding times associated with CDDs/CDFs in aqueous, solid, semi-solid, tissues, or other sample matrices. If stored in the dark at 0-4°C and preserved as given above (if required), aqueous samples may be stored for up to one year. Similarly, if stored in the dark at <-10°C, solid, semi-solid, multi-phase, and tissue samples may be stored for up to one year. (EPA 1613B)

**ACTION :** If holding times are exceeded, the concentrations are considered to be minimum concentrations and the detected results are flagged with "J" = holding times not met, possible low bias. Results not detected above the MDL are flagged "UJ".

If samples were incorrectly preserved flag the detected results are flagged with "J" = value is an estimate and results not detected above the MDL are flagged "UJ".

If holding times are grossly exceeded or the storage conditions are improper the reviewer may flag data "R" – rejected, unusable for any purpose.

**2.0 System Performance Checks**Mass Calibration and Resolution -----→ PFK Resolution  $\geq 10,000$ 

Were the compound pairs in the window defining mixtures determined ?

Is the height of the valley between the 2,3,7,8 isomers and most closely eluting isomer &lt; 25%

ACTION : Failure to meet either the resolution or the retention time window criteria invalidates all calibration or sample data collected during the 12-hour window. Associated data is flagged "R".

Yes No

|   |  |
|---|--|
| ✓ |  |
| ✓ |  |
| ✓ |  |

**3.0 Initial Calibration**

ICAL performed before sample analysis ?

Does the initial calibration curve contain 5 points and were all points used for calibration?

Do the ion abundance ratios in standards for all labeled and unlabeled PCDD and PCDF meet method 1613B requirements (Table 9) ?

Are compounds within the SIM windows and does the absolute RT of  $^{13}\text{C}_{12}$ -1,2,3,4-TCDD exceed 25 minutes on the DB-5 column and 15 minutes on the DB-225 column ?

Were the minimum reporting levels met and do all the labeled and unlabeled compounds in CS1 have a S/N greater than 10 ?

Is the average RR %RSD less than 20% for **isotope dilution** method of calibration ?

Yes No

|  |  |
|--|--|
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

ACTION : If any of the above requirements are not met then flag all detected results as "J" and all non-detects as "UJ".

**TABLE 9. THEORETICAL ION ABUNDANCE RATIOS AND QC LIMITS**

Method 1613B, October 1994

| Number of Chlorine Atoms | M/Z's Forming Ratio | Theoretical Ratio | Lower QC Limit | Upper QC Limit |
|--------------------------|---------------------|-------------------|----------------|----------------|
| 4 <sup>1</sup>           | M/(M+2)             | 0.77              | 0.65           | 0.89           |
| 5                        | (M+2)/(M+4)         | 1.55              | 1.32           | 1.78           |
| 6                        | (M+2)/(M+4)         | 1.24              | 1.05           | 1.43           |
| 6 <sup>2</sup>           | M/(M+2)             | 0.51              | 0.43           | 0.59           |
| 7                        | (M+2)/(M+4)         | 1.05              | 0.88           | 1.20           |
| 7                        | M/(M+2)             | 0.44              | 0.37           | 0.51           |
| 8                        | (M+2)/(M+4)         | 0.89              | 0.76           | 1.02           |

QC limits represent 15% windows around the theoretical ion abundance ratios.

- Does not apply to Cl<sub>17</sub>-2,3,7,8-TCDD (cleanup standard).
- Used for  $^{13}\text{C}_{12}$  -HxCDF only
- Used for  $^{13}\text{C}_{12}$  -HpCDF only

## 3.0 Calibration Verification VER TB26268

Do the ion abundance ratios in standards for all labeled and unlabeled PCDD and PCDF meet method 1613B requirements (Table 9) ?

Are compounds within the SIM windows and does the absolute RT of  $^{13}\text{C}_{12}$ -1,2,3,4-TCDD exceed 25 minutes on the DB-5 column and 15 minutes on the DB-225 column ?

Are the relative retention times (RRTs) within the ICAL limits ?

Were the minimum reporting levels met and do all the labeled and unlabeled compounds in CS3 have a S/N greater than 10 ?

Is the CV RR %RSD within  $\pm 20\%$  of the mean value from the ICAL for isotope dilution method of calibration ?  $\%D < 20$  and met 1613 criteria

| Yes            | No |
|----------------|----|
| ✓              |    |
| ✓              |    |
| checked by lab |    |
| ✓              |    |
| ✓              |    |

ACTION : If any of the above requirements are not met then flag all detected results as "J" and all non-detects as "UJ". If the S/N requirements are not met flag all estimated DLs (non-detects) as "R".

## 4.0 Compound Identification – examined for positive sample results

Are signals for the two exact m/z's present and do they maximize within  $\pm 2$  seconds?

Is the S/N  $\geq 2.5$  for a sample extract or 10 for a calibration standard?

Are the ion abundance ratios from EPA1613B Table 9 within the limits listed below – or within 10% of the most recent CS3 standard?

Are the relative retention time (RRT) ratios from EPA1613B Table 2 within limits?

If the compound was identified as PCDF - is there a signal (with S/N  $\geq 2.5$ ) at the same retention time ( $\pm 2$  seconds) in the PCDF channel – If YES then the PCDF is not confirmed and is flagged with R.

| Yes       | No |
|-----------|----|
| by lab    |    |
| by lab    |    |
| by lab    |    |
| by lab    |    |
| see below |    |

ACTION : Professional judgment is used to determine whether the data are flagged. If any of the signal maximization or RRT identification criteria are not met the results for that isomer should be qualified as "R" because the presence of the isomer cannot be confirmed. If the S/N criteria are not met or the PCDF S/N is greater than 2.5 then the sample result should be J flagged.

02474025 Total TCDF, PCDF, HxCDF, HpCDF all flagged "X" by lab  
02474032 Total HxCDF flagged X by lab.

### 5.0 Method Blanks

Was a method blank extracted with every 12-hour sample batch at a frequency of 1 in 20 ?

Yes No

|      |  |
|------|--|
| ✓    |  |
| ✓    |  |
| NA → |  |

Does the concentration of any analyte exceed the method reporting limit? (Or contract required reporting limit, CRDL) -- except OCDD/OCDF criteria is < 3x RL

Where samples rerun if the method blank did not meet criteria ?

| Method Blank Result | Sample Result      | Action                    |
|---------------------|--------------------|---------------------------|
| < CRDL              | ND                 | no action                 |
|                     | < CRDL             | Report CRDL with Flag "U" |
|                     | > CRDL             | Professional Judgement    |
| > or = CRDL         | < CRDL             | Report CRDL with Flag "U" |
|                     | > CRDL but < blank | Flag "U" or "J"           |
|                     | > CRDL and > blank | Professional Judgement    |
| Gross Contamination | Positive           | Flag "R", unusable        |

All cmpds non-detected in blank T026270

### 6.0 Laboratory Control Samples

Was an OPR (on-going precision and recovery) sample that included all analytes analyzed with the sample set?

Yes No

|   |  |
|---|--|
| ✓ |  |
| ✓ |  |

Does the OPR meet the criteria for %recovery, ion abundance ratio and relative retention times (RRT) ?

ACTION : Results for analytes not meeting the OPR criteria are qualified as "J" or "UJ". If the analyte is not recovered the results are qualified as "R".

### 7.0 Second Column Confirmation

Was a positive result for 2,3,7,8-TCDF confirmed on a second column or confirmed after further cleanup and second column analysis? No TCDF detected

Yes No

|  |  |
|--|--|
|  |  |
|--|--|

The primary column result should be reported and used if the identity is confirmed on a second column. The second column must meet all the criteria listed above (ICAL, CV, RTs, etc.) If the result is not confirmed R flag the data.

### 8.0 Labeled Compound Recoveries

Is the recovery of each C-13 labeled PCDF and PCDD isomer within 25%-150% ?

Yes No

|   |  |
|---|--|
| ✓ |  |
|---|--|



Is the recovery of  $^{13}\text{C}_{12}$ -1,2,3,4,-TCDD within 25%-150% ?

|   |  |
|---|--|
| ✓ |  |
| ✓ |  |

Is the recovery of  $^{13}\text{C}_{12}$ -1,2,3,7,8,9-HxCDD within 25%-150% ?

ACTION : If any C-13 labeled standard is outside the criteria then qualify detected results as "J" and non-detects as "UJ".

see SDO 59012 review for Rec. Std. area mean values

ACTION : There are no method criteria for these recoveries. Professional judgement should be used if these criteria are exceeded. If the labeled standard is outside the criteria then qualify detected results as "J". If the %R is less than 25% qualify non-detects as "UJ" and if the %R is < 10% qualify non-detects as "R".

#### 9.0 Project Quality Assurance Samples

Is the Field Duplicate RPD < 35% → broke in transit

Yes No

|  |  |
|--|--|
|  |  |
|  |  |

Are Equipment Blanks (if applicable) < MRL ? none

ACTION : Professional judgment is used to determine whether the data are flagged.

#### Lab Flags Applied

J = below RL

X = DPE in PCDF ions

## Data Usability Review Report for Dioxins/Furans - Taylor Lumber and Treating Field Investigation Soil Samples – July and August 2002 Sampling Event

PREPARED FOR: Trish Larson/CVO  
Robin Strauss/CVO

PREPARED BY: Scott Echols/CVO

DATE: January 9, 2003

Data from the 27 soil samples collected from the Taylor Lumber and Treating site were reviewed for quality assurance parameters to assess its usability. This review is in addition to the QA review conducted by the laboratory prior to releasing the data. All data are usable for the purposes of this project when the flagging applied by the laboratory and additional flags discussed below are taken into consideration.

All samples were analyzed using EPA Method SW8290 by Triangle Laboratories, Inc in Durham, NC. A list of samples analyzed is included in Table 1 at the end of this document.

### DATA QUALIFICATIONS

All data were reviewed using the performance specifications in EPA SW-846 Method SW8290, the project QAPP and National Functional Guidelines for Chlorinated Dioxin/Furan Data Review (EPA 540-R-02-003/March 2002) for guidance.

All field samples had results for one or more analytes that exceeded the calibration curve and are flagged E, estimates. In addition several samples have results for OCDD that are flagged "SE", minimum concentration due to detector saturation. The total results for several polychlorinated dibenzofuran (PCDF) isomers are flagged, "X", and/or reported as estimated maximum concentrations (EMPC) due to co-elution of polychlorodiphenyl ethers (PCDFE). All results flagged E and SE should be treated as the minimum concentration that might be present. The sample results flagged as EMPC or X are listed in Table 3 at the end of this document should be treated as the maximum concentration that might be present.

Field samples RS-04 and RS-09 were extracted and analyzed twice by the laboratory. The re-extraction was done as a pro-active measure by the laboratory because they originally felt the method blank associated with the samples was going to fail QC (communication from Lauren Tochacek, Triangle Labs, 12-3-02). The method blank passed QC and therefore both sets of sample data were valid. The results are somewhat different and it is recommended that both results be retained as there is likely reflective of the variability associated with these soil samples due to non-homogenous samples.

### **Holding Time – Acceptable**

The samples were collected on 7/29/2002 through 8/2/2002. The samples except RES-01B were extracted and analyzed within the technical holding time criteria given in EPA Method SW8290.

Sample RES-01B re-extracted after holding time expired. The initial extraction had associated blank contamination problems. All reported results for this sample reported above the detection limit are qualified as J and all results reported as not detected are qualified as UJ.

### **GC/MS Performance Check – Acceptable**

All of the GC/MS performance checks met mass resolution, ion abundance ratios, minimum reporting levels, retention time and 2,3,7,8-TCDD chromatographic resolution criteria.

### **Initial Calibration - Acceptable**

The average RF %RSD was less than 20% and the isotopic dilution method was used for calibration.

### **Continuing Calibration Verification – Acceptable**

The ion abundance ratios and compound percent recoveries were acceptable ( $\pm 20\%$ ) for target analytes. The  $^{13}\text{C}_{12}$ -OCDD internal standard was slightly outside criteria ( $-32.9\%$ , criteria for labeled compounds =  $30\%$ ) but since it was not grossly outside criteria ( $>40\%$ ) no flags were applied.

### **System Performance – Acceptable**

High recoveries above the acceptance criteria ( $70\%$ - $130\%$ ) were observed for the 2378-TCDD, 2378-TCDF, OCDD and OCDF laboratory control spike and laboratory control spike duplicate sample pair (LCS/LCSD) in SDG 58068. The percent recovery and relative percent difference for each analyte are shown in Table 2. The labeled compound recoveries were acceptable for the LCS/LCSD sample pairs in other associated SDGs.

No additional flags were applied to the data based on the LCS/LCSD in batch 58068. Because the labeled compound recoveries were acceptable and the LCS/LCSD in other SDGs were acceptable, it was judged that the high recoveries were due to background contamination associated with the very high concentration samples processed with this SDG and not due to any inherent high bias in the method for this matrix.

### **Method Blanks –**

**SDG 58068A** – Four analytes were detected above the method reporting limit (RL) in the method blank. Eight analytes were detected above the detection limit but below the reporting limit in the method blank.

**SDG 58068B** – No analytes were detected above the method reporting limit (RL) in the method blank. One analyte was detected above the detection limit but below the reporting limit in the method blank.

**SDG 58068Ar1** - No analytes were detected above the method reporting limit (RL) in the method blank. Two analytes were detected above the detection limit but below the reporting limit in the method blank.

**SDG 58068Ar2** - No analytes were detected in the method blank.

**SDG 58068Br1** - No analytes were detected above the method reporting limit (RL) in the method blank. One analyte was detected above the detection limit but below the reporting limit in the method blank.

Table 3 below lists the analytes detected and their concentrations in the method blanks. It also describes the action taken for samples in the associated SDG.

### **Polychlorinated Diphenyl Ether Interferences**

Table 4 lists all analytes affected by the elution of a polychlorinated diphenyl ether (PCDPE) at the same time as a polychlorinated dibenzofuran (PCDF) where the PCDPE peak intensity is at least 10% of the intensity of the PCDF peak. For these analytes the results may be biased high by the PCDPE and should be considered upper estimates of the amount present.

### **Recovery of C-13 Labeled Standards – Acceptable**

The recovery and abundance ratios of all C-13 labeled standards in samples except those listed below in Table 5 were within method SW8290 requirements.

No additional flags were applied on the basis of labeled standard recoveries. All recoveries outside of method 8290 criteria (40% - 135%) were below 40% the lowest of which was 25.7%. In each case the laboratory qualified the result as "V" indicating the result and all associated quantitations were considered to be reliable.

No additional flags were applied on the basis of ion abundance ratios. The laboratory applied a flag "RO" to internal standard  $^{13}\text{C}_{12}$ -OCDD in samples WF-05U, WF-12L, WF-12U, and DS-12 indicating a co-eluting interference which may have biased the recovery for this internal standard to be high. This means the results for the associated target analyte, OCDD, may be underestimated in each sample. However, no additional flags are applied to the data as the OCDD result for each of these samples was over the calibration range and already flagged, "SE".

| TABLE 1. SAMPLE CROSS-REFERENCE |                |            |
|---------------------------------|----------------|------------|
| SDG                             | Lab ID         | Field ID   |
| 58068A                          | 332-56-1       | WF-12L     |
| 58068A                          | 332-56-2       | WF-12U     |
| 58068A                          | 332-56-3       | WF-DUP3    |
| 58068A                          | 332-56-4       | RES-03A    |
| 58068A                          | 332-56-6       | RES-DUP    |
| 58068A                          | 332-56-10      | CS-3       |
| 58068A                          | 332-56-11      | DS-12      |
| 58068A                          | 332-56-12      | DS-04      |
| 58068B                          | 332-56-13      | DS-06      |
| 58068B                          | 332-56-14      | DS-13      |
| 58068B                          | 332-56-15      | DS-15      |
| 58068B                          | 332-56-16      | EF-10      |
| 58068B                          | 332-56-17      | EF-06      |
| 58068B                          | 332-56-18      | EF-01      |
| 58068B                          | 332-56-19      | WF-05L     |
| 58068B                          | 332-56-20      | WF-05U     |
| 58068B                          | 332-56-21      | RS-03      |
| 58068B                          | 332-56-22      | RS-DUP     |
| 58068B                          | 332-56-23      | RS-04      |
| 58068B                          | 332-56-24      | RS-09      |
| 58068B                          | 332-56-24MS/SD | RS-09MS/SD |
| 58068Br1                        | 332-56-24      | RS-09RE    |
| 58068Br1                        | 332-56-23      | RS-04RE    |
| 58068Ar1                        | 332-56-8       | RES-02B    |
| 58068Ar1                        | 332-56-7       | RES-04A    |
| 58068Ar1                        | 332-56-9       | RES-05A    |
| 58068Ar2                        | 332-56-5       | RES-01B    |

TABLE 2

LCS/LCSD Percent Recoveries and Relative Percent Differences for SDG 58068A

| Compound      | nominal (pg/g) | LCS  | %R   | LCSD | %R   | RPD  |
|---------------|----------------|------|------|------|------|------|
| 2378-TCDD     | 40             | 47.5 | 119% | 52.3 | 131% | -10% |
| 12378-PeCDD   | 200            | 256  | 128% | 273  | 137% | -6%  |
| 123478-HxCDD  | 200            | 197  | 99%  | 212  | 106% | -7%  |
| 123678-HxCDD  | 200            | 210  | 105% | 218  | 109% | -4%  |
| 123789-HxCDD  | 200            | 202  | 101% | 221  | 111% | -9%  |
| 1234678-HpCDD | 200            | 205  | 103% | 217  | 109% | -6%  |
| OCDD          | 400            | 356  | 89%  | 388  | 97%  | -9%  |
| 2378-TCDF     | 40             | 52.9 | 132% | 55.6 | 139% | -5%  |
| 12378-PeCDF   | 200            | 254  | 127% | 261  | 131% | -3%  |
| 23478-PeCDF   | 200            | 244  | 122% | 260  | 130% | -6%  |
| 123478-HxCDF  | 200            | 195  | 98%  | 213  | 107% | -9%  |
| 123678-HxCDF  | 200            | 213  | 107% | 231  | 116% | -8%  |
| 234678-HxCDF  | 200            | 205  | 103% | 228  | 114% | -11% |
| 123789-HxCDF  | 200            | 165  | 83%  | 194  | 97%  | -16% |
| 1234678-HpCDF | 200            | 256  | 128% | 265  | 133% | -3%  |
| 1234789-HpCDF | 200            | 176  | 88%  | 199  | 100% | -12% |
| OCDF          | 400            | 314  | 79%  | 349  | 87%  | -11% |

TABLE 3

Blank Flagging for Field Investigation Soil Samples

| SDG    | Compound      | Blank conc. (pg/g) | Blank Qual | Action for Sample Results < RL | Action for Sample Results > RL   |
|--------|---------------|--------------------|------------|--------------------------------|--|
| 58058A | 12378-PeCDD   | 0.27               | J          | Flag as U and retain value     | No action  |
| 58058A | 123478-HxCDD  | 0.45               | J          | Flag as U and retain value     | No action  |
| 58058A | 123678-HxCDD  | 4.6                | J          | Flag as U and retain value     | No action  |
| 58058A | 123789-HxCDD  | 1.4                | J          | Flag as U and retain value     | No action  |
| 58058A | 1234678-HpCDD | 133                | =          | Flag as U and retain value     | <ul style="list-style-type: none"> <li>Qualify all results &lt; 665 as U and retain result.</li> <li>Flag all results &gt; 665 as J</li> </ul>   |
| 58058A | OCDD          | 1230               | =          | Flag as U and retain value     | <ul style="list-style-type: none"> <li>Qualify all results &lt; 6150 as U and retain result.</li> <li>Flag all results &gt; 6150 as J</li> </ul> |
| 58058A | 23478-PeCDF   | 0.18               | EMPC-J     | Flag as U and retain value     | No action  |
| 58058A | 123478-HxCDF  | 0.8                | J          | Flag as U and retain value     | No action  |
| 58058A | 123678-HxCDF  | 0.33               | EMPC-J     | Flag as U and retain value     | No action  |
| 58058A | 234678-HxCDF  | 0.69               | EMPC-J     | Flag as U and retain value     | No action  |

| SDG      | Compound      | Blank conc. (pg/g) | Blank Qual | Action for Sample Results < RL | Action for Sample Results > RL   |
|----------|---------------|--------------------|------------|--------------------------------|--|
| 58058A   | 1234678-HpCDF | 9.8                | =          | Flag as U and retain value     | <ul style="list-style-type: none"> <li>Qualify all results &lt; 49 as U and retain result.</li> <li>Flag all results &gt; 49 as J</li> </ul>   |
| 58058A   | OCDF          | 28.2               | =          | Flag as U and retain value     | <ul style="list-style-type: none"> <li>Qualify all results &lt; 141 as U and retain result.</li> <li>Flag all results &gt; 141 as J</li> </ul> |
| 58068B   | OCDD          | 1.4                | J          | Flag as U and retain value     | No action  |
| 58068Br1 | OCDD          | 4.8                | J          | Flag as U and retain value     | No action  |
| 58068Ar1 | 1234678-HpCDD | 0.57               | J          | Flag as U and retain value     | No action  |
| 58068Ar1 | OCDD          | 4.8                | J          | Flag as U and retain value     | No action  |

**Table 4. Samples and Analytes Qualified by Laboratory for Polychlorodiphenylether PCDDPE co-elution**

| SDG    | Sample ID | Compound   | Result (pg/g) | Qualifier |
|--------|-----------|------------|---------------|-----------|
| 58068A | TLI Blank | TCDF       | 3.8           | MX        |
| 58068A | TLI Blank | PECDF      | 9.5           | MX        |
| 58068A | TLI Blank | HXCDF      | 30.1          | MX        |
| 58068A | WF-12L    | TCDF       | 5200          | MXE       |
| 58068A | WF-12L    | PECDF12378 | 2320          | MXE       |
| 58068A | WF-12L    | PECDF      | 16020         | MXE       |
| 58068A | WF-12L    | HXCDF      | 58130         | MXE       |
| 58068A | WF-12U    | TCDF       | 1390          | MXE       |
| 58068A | WF-12U    | PECDF      | 5980          | MXE       |
| 58068A | WF-12U    | HXCDF      | 23700         | MXE       |
| 58068A | WF-DUP3   | TCDF       | 511           | MX        |
| 58068A | WF-DUP3   | PECDF      | 2980          | MX        |
| 58068A | WF-DUP3   | HXCDF      | 9070          | MXE       |
| 58068A | RES-03A   | TCDF       | 1210          | MXE       |
| 58068A | RES-03A   | PECDF      | 1560          | MX        |
| 58068A | RES-03A   | HXCDF      | 4320          | MX        |
| 58068A | RES-03A   | HPCDF      | 4790          | MXE       |
| 58068A | RES-DUP   | TCDF       | 521           | MX        |

**Table 4. Samples and Analytes Qualified by Laboratory for Polychlorodiphenylether PCDPE co-elution**

| SDG      | Sample ID | Compound | Result (pg/g) | Qualifier |
|----------|-----------|----------|---------------|-----------|
| 58068A   | RES-DUP   | PECDF    | 1080          | MX        |
| 58068A   | RES-DUP   | HXCDF    | 2980          | MX        |
| 58068A   | CS-3      | TCDF     | 1070          | MXE       |
| 58068A   | CS-3      | PECDF    | 3420          | MX        |
| 58068A   | CS-3      | HXCDF    | 10750         | MXE       |
| 58068A   | CS-3      | HPCDF    | 13550         | MXE       |
| 58068A   | DS-12     | TCDF     | 3490          | MXE       |
| 58068A   | DS-12     | PECDF    | 13500         | MXE       |
| 58068A   | DS-12     | HXCDF    | 46120         | MXE       |
| 58068A   | DS-12     | HPCDF    | 59060         | MXE       |
| 58068A   | DS-04     | TCDF     | 860           | MX        |
| 58068A   | DS-04     | PECDF    | 2220          | MX        |
| 58068A   | DS-04     | HXCDF    | 6240          | MXE       |
| 58068A   | DS-04     | HPCDF    | 7090          | MXE       |
| 58068Ar1 | RES-04A   | TCDF     | 109           | MX        |
| 58068Ar1 | RES-04A   | PECDF    | 132           | MX        |
| 58068Ar1 | RES-04A   | HXCDF    | 273           | MX        |
| 58068Ar1 | RES-02B   | TCDF     | 43.7          | MX        |
| 58068Ar1 | RES-02B   | PECDF    | 81.1          | MX        |
| 58068Ar1 | RES-02B   | HXCDF    | 222           | MX        |
| 58068Ar1 | RES-05A   | TCDF     | 31.7          | MX        |
| 58068Ar1 | RES-05A   | PECDF    | 72.2          | MX        |
| 58068Ar1 | RES-05A   | HXCDF    | 220           | MX        |
| 58068Ar2 | RES-01B   | TCDF     | 110           | MX        |
| 58068Ar2 | RES-01B   | PECDF    | 101           | MX        |
| 58068Ar2 | RES-01B   | HXCDF    | 116           | MX        |
| 58068Ar2 | RES-01B   | HPCDF    | 102           | MX        |
| 58068B   | DS-06     | TCDF     | 778           | MX        |
| 58068B   | DS-06     | PECDF    | 4370          | MXE       |
| 58068B   | DS-06     | HXCDF    | 14030         | MXE       |
| 58068B   | DS-06     | HPCDF    | 16890         | MXE       |
| 58068B   | DS-13     | TCDF     | 39.9          | MX        |



| <b>Table 4. Samples and Analytes Qualified by Laboratory for Polychlorodiphenylether PCDPE co-elution</b> |                  |                 |                      |                  |
|---|------------------|-----------------|----------------------|------------------|
| <b>SDG</b>  | <b>Sample ID</b> | <b>Compound</b> | <b>Result (pg/g)</b> | <b>Qualifier</b> |
| 58068B  | DS-13            | PECDF           | 138                  | MX               |
| 58068B  | DS-13            | HXCDF           | 440                  | MX               |
| 58068B  | DS-13            | HPCDF           | 469                  | MX               |
| 58068B  | DS-15            | TCDF            | 167                  | MX               |
| 58068B  | DS-15            | PECDF           | 1040                 | MX               |
| 58068B  | DS-15            | HXCDF           | 2300                 | MX               |
| 58068B  | DS-15            | HPCDF           | 2310                 | MX               |
| 58068B  | EF-10            | TCDF            | 98.5                 | MX               |
| 58068B  | EF-10            | PECDF           | 257                  | MX               |
| 58068B  | EF-10            | HXCDF           | 759                  | MX               |
| 58068B  | EF-10            | HPCDF           | 817                  | MX               |
| 58068B  | EF-06            | TCDF            | 221                  | MX               |
| 58068B  | EF-06            | PECDF           | 839                  | MX               |
| 58068B  | EF-06            | HXCDF           | 2290                 | MX               |
| 58068B  | EF-06            | HPCDF           | 2590                 | MX               |
| 58068B  | EF-01            | TCDF            | 22.1                 | MX               |
| 58068B  | EF-01            | PECDF           | 123                  | MX               |
| 58068B  | EF-01            | HXCDF           | 334                  | MX               |
| 58068B  | WF-05L           | TCDF            | 595                  | MX               |
| 58068B  | WF-05L           | PECDF           | 2740                 | MX               |
| 58068B  | WF-05L           | HXCDF           | 8260                 | MXE              |
| 58068B  | WF-05L           | HPCDF           | 11140                | MXE              |
| 58068B  | WF-05U           | TCDF            | 810                  | MX               |
| 58068B  | WF-05U           | PECDF           | 9770                 | MXE              |
| 58068B  | WF-05U           | HXCDF           | 33400                | MXE              |
| 58068B  | RS-03            | TCDF            | 0.8                  | MX               |
| 58068B  | RS-03            | PECDF           | 2.3                  | MX               |
| 58068B  | RS-03            | HXCDF           | 5.5                  | MX               |
| 58068B  | RS-DUP           | TCDF            | 0.64                 | MX               |
| 58068B  | RS-DUP           | PECDF           | 1.7                  | MX               |
| 58068B  | RS-DUP           | HXCDF           | 3.2                  | MX               |
| 58068Br1  | RS-09            | TCDF            | 2.1                  | MX               |

**Table 4. Samples and Analytes Qualified by Laboratory for Polychlorodiphenylether PCDFE co-elution**

| SDG      | Sample ID | Compound | Result (pg/g) | Qualifier |
|----------|-----------|----------|---------------|-----------|
| 58068Br1 | RS-04     | TCDF     | 1.4           | MX        |
| 58068Br1 | RS-04     | HXCDF    | 6.9           | MX        |

**Table 5. Internal Standards Qualified by Laboratory for Ion Abundance or Percent Recovery**

| SDG    | Sample Id | Parameter    | Lab Qualifier | Percent Recovery |
|--------|-----------|--------------|---------------|------------------|
| 58068B | WF-05U    | OCDDC13      | RO            | 40.5             |
| 58068B | DS-06     | DF12378C13   | V             | 36.4             |
| 58068B | DS-06     | DF23478C13   | V             | 26.9             |
| 58068B | DS-06     | DD12378C13   | V             | 34.9             |
| 58068B | DS-06     | DF234678C13  | V             | 32.4             |
| 58068B | DS-06     | DF1234678C13 | V             | 39.3             |
| 58068B | DS-06     | DF1234789C13 | V             | 32.7             |
| 58068B | DS-06     | DD1234678C13 | V             | 35.1             |
| 58068B | DS-06     | OCDDC13      | V             | 29.8             |
| 58068B | EF-06     | TCDD2378C13  | V             | 34.8             |
| 58068B | EF-06     | DF12378C13   | V             | 29.1             |
| 58068B | EF-06     | DF23478C13   | V             | 28.6             |
| 58068B | EF-06     | DD12378C13   | V             | 29.8             |
| 58068B | EF-06     | DF123789C13  | V             | 35.7             |
| 58068B | EF-06     | DD123478C13  | V             | 39.2             |
| 58068B | EF-06     | DF1234678C13 | V             | 30.5             |
| 58068B | EF-06     | DF1234789C13 | V             | 26.4             |
| 58068B | EF-06     | DD1234678C13 | V             | 31               |
| 58068B | EF-06     | OCDDC13      | V             | 25.7             |
| 58068B | WF-05L    | DF12378C13   | V             | 38.8             |
| 58068B | WF-05L    | DF23478C13   | V             | 29.9             |
| 58068B | WF-05L    | DD12378C13   | V             | 37.8             |
| 58068B | WF-05L    | DF234678C13  | V             | 32.7             |
| 58068B | WF-05L    | DF1234789C13 | V             | 33.1             |
| 58068B | WF-05L    | DD1234678C13 | V             | 37.1             |
| 58068B | WF-05L    | OCDDC13      | V             | 29.8             |

| <b>Table 5. Internal Standards Qualified by Laboratory for Ion Abundance or Percent Recovery</b> |                  |                  |                      |                         |
|--|------------------|------------------|----------------------|-------------------------|
| <b>SDG</b>   | <b>Sample Id</b> | <b>Parameter</b> | <b>Lab Qualifier</b> | <b>Percent Recovery</b> |
| 58068B   | WF-05U           | DF12378C13       | V                    | 35.4                    |
| 58068B   | WF-05U           | DF23478C13       | V                    | 28.6                    |
| 58068B   | WF-05U           | DD12378C13       | V                    | 33                      |
| 58068B   | Clean Up Blk     | DF234678C13      | V                    | 33.9                    |
| 58068B   | DS-06            | TCDF2378C13      | V                    | 38.3                    |
| 58068B   | EF-06            | TCDF2378C13      | V                    | 34                      |
| 58068B   | WF-05L           | TCDF2378C13      | V                    | 38.1                    |
| 58068Br1   | TLI LCSD         | OCDDC13          | V                    | 39.3                    |
| 58068Br1   | RS-09            | OCDDC13          | V                    | 39.4                    |
| 58068Br1   | RS-04            | DF1234789C13     | V                    | 38.4                    |
| 58068Br1   | RS-04            | OCDDC13          | V                    | 35.9                    |
| 58068A   | WF-12L           | OCDDC13          | QRO                  | 97.6                    |
| 58068A   | WF-12U           | OCDDC13          | QRO                  | 58.4                    |
| 58068A   | DS-12            | OCDDC13          | QRO                  | 74.7                    |
| 58068A   | RES-DUP          | DF1234789C13     | V                    | 37.8                    |
| 58068Ar1   | TLI LCSD         | OCDDC13          | V                    | 98                      |

|                    |                                   |                            |                |
|--------------------|-----------------------------------|----------------------------|----------------|
| Project Name:      | Taylor Lumber Field Investigation |                            |                |
| Project Number:    | 16S241. AN.01                     |                            |                |
| SDG Batch:         | 58068A                            |                            |                |
| Sampling Date(s):  | 7/30, 8/1, 8/2 2002               |                            |                |
| Matrix:            | soils by SW8290-                  |                            |                |
| Number of Samples: | 8                                 |                            |                |
| Sample Field IDs:  | WF-12L<br>WF-12U<br>WF-DUP3       | RES-03A<br>RES-DUP<br>CS-3 | DS-12<br>DS-04 |
| Reviewed by:       | Scott F. Edue                     |                            |                |
| Date:              | 9-16-02                           |                            |                |

### 1.0 Holding Time and Preservation of Samples

Have ~~any~~ of the following holding times been met ?

Water, 30 days from sample collection to extraction (7 days for CWA or SWDA samples)

Soil/sediment, 30 days from sample collection to extraction

All samples, 30 days from extraction to analysis

Were the samples correctly preserved ?

Water, 4°C in the dark, Chlorine residual (if any) neutralized

Soil/sediment, 4°C in the dark

| Yes  | No |
|------|----|
| NA → |    |
| ✓    |    |
| ✓    |    |
|      |    |
| NA → |    |
| ✓    |    |

Note: Extraction holding times are listed as recommended. There are no demonstrated maximum holding times associated with CDDs/CDFs in aqueous, solid, semi-solid, tissues, or other sample matrices. If stored in the dark at 0-4°C and preserved as given above (if required), aqueous samples may be stored for up to one year. Similarly, if stored in the dark at <-10°C, solid, semi-solid, multi-phase, and tissue samples may be stored for up to one year. (EPA 1613B)

**ACTION :** If holding times are exceeded, the concentrations are considered to be minimum concentrations and the detected results are flagged with "J" = holding times not met, possible low bias. Results not detected above the MDL are flagged "UJ".

If samples were incorrectly preserved flag the detected results are flagged with "J" = value is an estimate and results not detected above the MDL are flagged "UJ".

If holding times are grossly exceeded or the storage conditions are improper the reviewer may flag data "R" – rejected, unusable for any purpose.

**2.0 System Performance Checks**Mass Calibration and Resolution -----> PFK Resolution  $\geq 10,000$ 

Were the compound pairs in the window defining mixtures determined ?

Is the height of the valley between the 2,3,7,8 isomers and most closely eluting isomer &lt; 25%

| Yes                                 | No                       |
|-------------------------------------|--------------------------|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |

ACTION : Failure to meet either the resolution or the retention time window criteria invalidates all calibration or sample data collected during the 12-hour window. Associated data is flagged "R".

**3.0 Initial Calibration**

ICAL performed before sample analysis ?

Does the initial calibration curve contain 5 points and were all points used for calibration?

Do the ion abundance ratios in standards for all labeled and unlabeled PCDD and PCDF meet method 1613B requirements (Table 9) ?

Are compounds within the SIM windows and does the absolute RT of  $^{13}\text{C}_{12}$ -1,2,3,4-TCDD exceed 25 minutes on the DB-5 column and 15 minutes on the DB-225 column ?

Were the minimum reporting levels met and do all the labeled and unlabeled compounds in CS1 have a S/N greater than 10 ?

Is the average RR %RSD less than 20% for **isotope dilution** method of calibration ?

| Yes                                 | No                       |
|-------------------------------------|--------------------------|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |

ACTION : If any of the above requirements are not met then flag all detected results as "J" and all non-detects as "UJ".

**TABLE 9. THEORETICAL ION ABUNDANCE RATIOS AND QC LIMITS***Method 1613B, October 1994*

| Number of Chlorine Atoms | M/Z's Forming Ratio | Theoretical Ratio | Lower QC Limit | Upper QC Limit |
|--------------------------|---------------------|-------------------|----------------|----------------|
| 4 <sup>1</sup>           | M/(M+2)             | 0.77              | 0.65           | 0.89           |
| 5                        | (M+2)/(M+4)         | 1.55              | 1.32           | 1.78           |
| 6                        | (M+2)/(M+4)         | 1.24              | 1.05           | 1.43           |
| 6 <sup>2</sup>           | M/(M+2)             | 0.51              | 0.43           | 0.59           |
| 7                        | (M+2)/(M+4)         | 1.05              | 0.88           | 1.20           |
| 7 <sup>3</sup>           | M/(M+2)             | 0.44              | 0.37           | 0.51           |
| 8                        | (M+2)/(M+4)         | 0.89              | 0.76           | 1.02           |

QC limits represent 15% windows around the theoretical ion abundance ratios.

- Does not apply to Cl<sub>13</sub>-2,3,7,8-TCDD (cleanup standard).
- Used for  $^{13}\text{C}_{12}$  -HxCDF only
- Used for  $^{13}\text{C}_{12}$  -HpCDF only

### 3.0 Calibration Verification

Do the ion abundance ratios in standards for all labeled and unlabeled PCDD and PCDF meet method 1613B requirements (Table 9) ?

Are compounds within the SIM windows and does the absolute RT of  $^{13}\text{C}_{12}$ -1,2,3,4-TCDD exceed 25 minutes on the DB-5 column and 15 minutes on the DB-225 column ?

Are the relative retention times (RRTs) within the ICAL limits ?

Were the minimum reporting levels met and do all the labeled and unlabeled compounds in CS3 have a S/N greater than 10 ?

Is the CV RR %RSD within  $\pm 20\%$  of the mean value from the ICAL for **isotope dilution** method of calibration ?

| Yes                                 | No                       |
|-------------------------------------|--------------------------|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |

ACTION : If any of the above requirements are not met then flag all detected results as "J" and all non-detects as "UJ". If the S/N requirements are not met flag all estimated DLs (non-detects) as "R".

labeled  
criteria  
 $\pm 30\%$

8/25/02 5023992 CONCAL 10 - all OK  
8/26/02 5024019 CONCAL 10 - { 1,3,6,8-TCDD (non-target) 22.1% D  
8/26/02 5024006 CONCAL 10 { 13 C<sub>12</sub>-OCDD (-26.7%) rerun as 5024006  
8/27/02 5024034 75024005 which was good

### 4.0 Compound Identification - examined for positive sample results

Are signals for the two exact m/z's present and do they maximize within  $\pm 2$  seconds?

Is the S/N  $\geq 2.5$  for a sample extract or 10 for a calibration standard?

Are the ion abundance ratios from EPA1613B Table 9 within the limits listed below - or within 10% of the most recent CS3 standard?

Are the relative retention time (RRT) ratios from EPA1613B Table 2 within limits?

If the compound was identified as PCDF - is there a signal (with S/N  $\geq 2.5$ ) at the same retention time ( $\pm 2$  seconds) in the PCDF channel - If YES then the PCDF is not confirmed and is flagged with R.

| Yes                                 | No                       |
|-------------------------------------|--------------------------|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Flagged<br>X                        | when<br>PCDFE coeluted   |

ACTION : Professional judgment is used to determine whether the data are flagged. If any of the signal maximization or RRT identification criteria are not met the results for that isomer should be qualified as "R" because the presence of the isomer cannot be confirmed. If the S/N criteria are not met or the PCDFE S/N is greater than 2.5 then the sample result should be J flagged.

TL1 Blank (5023994)

"X" total TCDF, PCDF, HxCDF, HpCDF

### 5.0 Method Blanks

Was a method blank extracted with every 12-hour sample batch at a frequency of 1 in 20 ?

Does the concentration of any analyte exceed the method reporting limit? (Or contract required reporting limit, CRDL) -- except OCDD/OCDF criteria is < 3x RL

Where samples rerun if the method blank did not meet criteria ?

Yes No

|     |  |
|-----|--|
| ✓   |  |
| ✓   |  |
| ✓ ① |  |

| Method Blank Result | Sample Result      | Action                    |
|---------------------|--------------------|---------------------------|
| < CRDL              | ND                 | no action                 |
|                     | < CRDL             | Report CRDL with Flag "U" |
|                     | > CRDL             | Professional Judgement    |
| > or = CRDL         | < CRDL             | Report CRDL with Flag "U" |
|                     | > CRDL but < blank | Flag "U" or "J"           |
|                     | > CRDL and > blank | Professional Judgement    |
| Gross Contamination | Positive           | Flag "R", unusable        |

① RES-01B  
-04A  
05A  
02B

re-extracted and re-analyzed. Those with results above cal curve not re-extracted.

re-report 5808A

TL1 Blank File S023994

1,2,3,7,8-PeCDF 0.27 pg/g  
1,2,3,4,7,8-HxCDD 0.45  
1,2,3,6,7,8-HxCDD 4.6  
1,2,3,7,8,9-HxCDD 1.4  
1,2,3,4,6,7,8-HxCDD 133  
OCDD 1230

1,2,3,4,7,8-HxCDF 0.80  
1,2,3,4,6,7,8-HpCDF 9.8  
1,2,3,4,6,7,8,9-OCDF 28.2  
EMPL 2,3,4,7,8-PeCDF 0.18  
1,2,3,6,7,8-HxCDF 0.33  
2,3,4,6,7,8-HxCDF 0.69

125/s

} possible DPE interference

### 6.0 Laboratory Control Samples

Was an OPR (on-going precision and recovery) sample that included all analytes analyzed with the sample set? LCS / LCS D

Does the OPR meet the criteria for %recovery, ion abundance ratio and relative retention times (RRT)?

ACTION: Results for analytes not meeting the OPR criteria are qualified as "J" or "UJ". If the analyte is not recovered the results are qualified as "R".

Yes No

|   |   |
|---|---|
| ✓ |   |
|   | ✓ |

TCDD/TCDF  
410 pg/g  
others @  
400 pg/g  
OCDD/OCDF  
400 pg/g  
others  
200 pg/g

Some % recovery out high likely due to blank sample

2,3,7,8-TCDF J/UJ ; 2,3,7,8-TCDD J/UJ ; OCDF J/UJ ; OCDD J/UJ

### 7.0 Second Column Confirmation

Was a positive result for 2,3,7,8-TCDF confirmed on a second column or confirmed after further cleanup and second column analysis?

The primary column result should be reported and used if the identity is confirmed on a second column. The second column must meet all the criteria listed above (ICAL, CV, RTs, etc.) If the result is not confirmed R flag the data.

Yes No

|   |  |
|---|--|
| ✓ |  |
|---|--|

### 8.0 Labeled Compound Recoveries

Is the recovery of each C-13 labeled PCDF and PCDD isomer within 25%-150% ?

Yes No

|   |  |
|---|--|
| ✓ |  |
|---|--|

Not Flagged due to judgement that high LCS were isolated and due to high level cleanup from

Is the recovery of  $^{13}\text{C}_{12}$ -1,2,3,4,-TCDD within 25%-150% ?

|   |  |
|---|--|
| ✓ |  |
| ✓ |  |

Is the recovery of  $^{13}\text{C}_{12}$ -1,2,3,7,8,9-HxCDD within 25%-150% ?

ACTION : If any C-13 labeled standard is outside the criteria then qualify detected results as "J" and non-detects as "UJ".

ACTION : There are no method criteria for these recoveries. Professional judgement should be used if these criteria are exceeded. If the labeled standard is outside the criteria then qualify detected results as "J". If the %R is less than 25% qualify non-detects as "UJ" and if the %R is < 10% qualify non-detects as "R".

### 9.0 Project Quality Assurance Samples

Is the Field Duplicate RPD < 35%

| Yes | No |
|-----|----|
| NA  |    |
| NA  |    |

Are Equipment Blanks (if applicable) < MRL ?

ACTION : Professional judgment is used to determine whether the data are flagged.



|                    |                          |
|--------------------|--------------------------|
| Project Name:      | Taylor Lumber            |
| Project Number:    | 165241.AN.02             |
| SDG Batch:         | 58068 Ar1                |
| Sampling Date(s):  | 8/1/02                   |
| Matrix:            | soil                     |
| Number of Samples: | 3                        |
| Sample Field IDs:  | RES02A, RES-04A, RES-05A |
| Reviewed by:       |                          |
| Date:              | 9-25-02 from notes       |

### 1.0 Holding Time and Preservation of Samples

Have the following holding times been met ?

Water, 30 days from sample collection to extraction (7 days for CWA or SWDA samples)

Soil/sediment, 30 days from sample collection to extraction

All samples, 30 days from extraction to analysis

Were the samples correctly preserved ?

Water, 4°C in the dark, Chlorine residual (if any) neutralized

Soil/sediment, 4°C in the dark

| Yes | No |
|-----|----|
|     |    |
| ✓   |    |
| ✓   |    |
|     |    |
|     |    |
| ✓   |    |

Note: Extraction holding times are listed as recommended. There are no demonstrated maximum holding times associated with CDDs/CDFs in aqueous, solid, semi-solid, tissues, or other sample matrices. If stored in the dark at 0-4°C and preserved as given above (if required), aqueous samples may be stored for up to one year. Similarly, if stored in the dark at <-10°C, solid, semi-solid, multi-phase, and tissue samples may be stored for up to one year. (EPA 1613B)

**ACTION :** If holding times are exceeded, the concentrations are considered to be minimum concentrations and the detected results are flagged with "J" = holding times not met, possible low bias. Results not detected above the MDL are flagged "UJ".

If samples were incorrectly preserved flag the detected results are flagged with "J" = value is an estimate and results not detected above the MDL are flagged "UJ".

If holding times are grossly exceeded or the storage conditions are improper the reviewer may flag data "R" – rejected, unusable for any purpose.

**2.0 System Performance Checks**Mass Calibration and Resolution -----> PFK Resolution  $\geq 10,000$ 

Were the compound pairs in the window defining mixtures determined ?

Is the height of the valley between the 2,3,7,8 isomers and most closely eluting isomer &lt; 25%

ACTION : Failure to meet either the resolution or the retention time window criteria invalidates all calibration or sample data collected during the 12-hour window. Associated data is flagged "R".

| Yes                                 | No                       |
|-------------------------------------|--------------------------|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |

**3.0 Initial Calibration**

ICAL performed before sample analysis ?

Does the initial calibration curve contain 5 points and were all points used for calibration?

Do the ion abundance ratios in standards for all labeled and unlabeled PCDD and PCDF meet method 1613B requirements (Table 9) ?

Are compounds within the SIM windows and does the absolute RT of  $^{13}\text{C}_{12}$ -1,2,3,4-TCDD exceed 25 minutes on the DB-5 column and 15 minutes on the DB-225 column ?

Were the minimum reporting levels met and do all the labeled and unlabeled compounds in CS1 have a S/N greater than 10 ?

Is the average RR %RSD less than 20% for **isotope dilution** method of calibration ?

| Yes                                 | No                       |
|-------------------------------------|--------------------------|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |

ACTION : If any of the above requirements are not met then flag all detected results as "J" and all non-detects as "UJ".

**TABLE 9. THEORETICAL ION ABUNDANCE RATIOS AND QC LIMITS**  
Method 1613B, October 1994

| Number of Chlorine Atoms | M/Z's Forming Ratio | Theoretical Ratio | Lower QC Limit | Upper QC Limit |
|--------------------------|---------------------|-------------------|----------------|----------------|
| 4 <sup>1</sup>           | M/(M+2)             | 0.77              | 0.65           | 0.89           |
| 5                        | (M+2)/(M+4)         | 1.55              | 1.32           | 1.78           |
| 6                        | (M+2)/(M+4)         | 1.24              | 1.05           | 1.43           |
| 6 <sup>2</sup>           | M/(M+2)             | 0.51              | 0.43           | 0.59           |
| 7                        | (M+2)/(M+4)         | 1.05              | 0.88           | 1.20           |
| 7                        | M/(M+2)             | 0.44              | 0.37           | 0.51           |
| 8                        | (M+2)/(M+4)         | 0.89              | 0.76           | 1.02           |

QC limits represent 15% windows around the theoretical ion abundance ratios.

1. Does not apply to Cl<sub>17</sub>-2,3,7,8-TCDD (cleanup standard).
2. Used for  $^{13}\text{C}_{12}$  -HxCDF only
3. Used for  $^{13}\text{C}_{12}$  -HpCDF only

**3.0 Calibration Verification**

Do the ion abundance ratios in standards for all labeled and unlabeled PCDD and PCDF meet method 1613B requirements (Table 9) ?

Are compounds within the SIM windows and does the absolute RT of  $^{13}\text{C}_{12}$ -1,2,3,4-TCDD exceed 25 minutes on the DB-5 column and 15 minutes on the DB-225 column ?

Are the relative retention times (RRTs) within the ICAL limits ?

Were the minimum reporting levels met and do all the labeled and unlabeled compounds in CS3 have a S/N greater than 10 ?

Is the CV RR %RSD within  $\pm 20\%$  of the mean value from the ICAL for **isotope dilution** method of calibration ?  $\pm 30\%$  labeled

| Yes | No |
|-----|----|
| ✓   |    |
| ✓   |    |
| ✓   |    |
| ✓   |    |
| ✓   |    |

ACTION : If any of the above requirements are not met then flag all detected results as "J" and all non-detects as "UJ". If the S/N requirements are not met flag all estimated DLs (non-detects) as "R".

**4.0 Compound Identification – examined for positive sample results**

Are signals for the two exact m/z's present and do they maximize within  $\pm 2$  seconds?

Is the S/N  $\geq 2.5$  for a sample extract or 10 for a calibration standard?

Are the ion abundance ratios from EPA1613B Table 9 within the limits listed below – or within 10% of the most recent CS3 standard?

Are the relative retention time (RRT) ratios from EPA1613B Table 2 within limits?

If the compound was identified as PCDF - is there a signal (with S/N  $\geq 2.5$ ) at the same retention time ( $\pm 2$  seconds) in the PCDPE channel – If YES then the PCDF is not confirmed and is flagged with R.

| Yes                   | No |
|-----------------------|----|
| ✓ by lab              |    |
| ✓ by lab              |    |
| ✓ by lab              |    |
| ✓ by lab              |    |
| Several<br>flagged as |    |

ACTION : Professional judgment is used to determine whether the data are flagged. If any of the signal maximization or RRT identification criteria are not met the results for that isomer should be qualified as "R" because the presence of the isomer cannot be confirmed. If the S/N criteria are not met or the PCDPE S/N is greater than 2.5 then the sample result should be J flagged.

indicating  
PCDPE interference  
totals only were affected

**5.0 Method Blanks**

Was a method blank extracted with every 12-hour sample batch at a frequency of 1 in 20 ?

Does the concentration of any analyte exceed the method reporting limit? (Or contract required reporting limit, CRDL) -- except OCDD/OCDF criteria is  $< 3 \times \text{RL}$

Where samples rerun if the method blank did not meet criteria ?

Yes No

|    |   |
|----|---|
| ✓  |   |
|    | ✓ |
| NA | 0 |

| Method Blank Result | Sample Result      | Action                    |
|---------------------|--------------------|---------------------------|
| < CRDL              | ND                 | no action                 |
|                     | < CRDL             | Report CRDL with Flag "U" |
|                     | > CRDL             | Professional Judgement    |
| > or = CRDL         | < CRDL             | Report CRDL with Flag "U" |
|                     | > CRDL but < blank | Flag "U" or "J"           |
|                     | > CRDL and > blank | Professional Judgement    |
| Gross Contamination | Positive           | Flag "R", unusable        |

total HxCDD 1.1 J

HxCDD 1234678 6.57 J

TLT Blank 58068Arl → all detects listed above were < RL.

**6.0 Laboratory Control Samples**

Was an <sup>LCS/LCSP</sup>OPR (on-going precision and recovery) sample that included all analytes analyzed with the sample set?

Does the <sup>LCS/LCSP</sup>OPR meet the criteria for %recovery, ion abundance ratio and relative retention times (RRT) ?

Yes No

|   |  |
|---|--|
| ✓ |  |
| ✓ |  |

ACTION : Results for analytes not meeting the OPR criteria are qualified as "J" or "UJ". If the analyte is not recovered the results are qualified as "R".

**7.0 Second Column Confirmation**

Was a positive result for 2,3,7,8-TCDF confirmed on a second column or confirmed after further cleanup and second column analysis?

Yes No

|   |  |
|---|--|
| ✓ |  |
|---|--|

The primary column result should be reported and used if the identity is confirmed on a second column. The second column must meet all the criteria listed above (ICAL, CV, RTs, etc.) If the result is not confirmed R flag the data.

**8.0 Labeled Compound Recoveries**

Is the recovery of each C-13 labeled PCDF and PCDD isomer within 25%-150% ?

Yes No

|   |  |
|---|--|
| ✓ |  |
|---|--|

40-135%  
SW8290

Is the recovery of  $^{13}\text{C}_{12}$ -1,2,3,4,-TCDD within 25%-150%? *25%-400%*

Is the recovery of  $^{13}\text{C}_{12}$ -1,2,3,7,8,9-HxCDD within 25%-150%? *25%-400%*

|                                     |  |
|-------------------------------------|--|
| <input checked="" type="checkbox"/> |  |
| <input checked="" type="checkbox"/> |  |

ACTION : If any C-13 labeled standard is outside the criteria then qualify detected results as "J" and non-detects as "UJ".

*per. Region 10 guidance used  
25%-400%*

ACTION : There are no method criteria for these recoveries. Professional judgement should be used if these criteria are exceeded. If the labeled standard is outside the criteria then qualify detected results as "J". If the %R is less than 25% qualify non-detects as "UJ" and if the %R is < 10% qualify non-detects as "R".

### 9.0 Project Quality Assurance Samples

Is the Field Duplicate RPD < 35%

Are Equipment Blanks (if applicable) < MRL ?

| Yes       | No       |
|-----------|----------|
| <i>NA</i> | <i>0</i> |
| <i>NA</i> |          |

ACTION : Professional judgment is used to determine whether the data are flagged.

|                    |                                   |
|--------------------|-----------------------------------|
| Project Name:      | Taylor Lumber Field Investigation |
| Project Number:    | 165241.AN.01                      |
| SDG Batch:         | 58068 Ar 2                        |
| Sampling Date(s):  | 7-30                              |
| Matrix:            | Soil                              |
| Number of Samples: | 1                                 |
| Sample Field IDs:  | RES-dB                            |
| Reviewed by:       | SOE dwer                          |
| Date:              | 9/25/02                           |

copied to this page  
from notes 12-2-02

### 1.0 Holding Time and Preservation of Samples

Have the following holding times been met ?

Water, 30 days from sample collection to extraction (7 days for CWA or SWDA samples)

Soil/sediment, 30 days from sample collection to extraction

All samples, 30 days from extraction to analysis

Were the samples correctly preserved ?

Water, 4°C in the dark, Chlorine residual (if any) neutralized

Soil/sediment, 4°C in the dark

| Yes | No |
|-----|----|
|     |    |
|     | ✓  |
| ✓   |    |
|     |    |
|     |    |
| ✓   |    |

Note: Extraction holding times are listed as recommended. There are no demonstrated maximum holding times associated with CDDs/CDFs in aqueous, solid, semi-solid, tissues, or other sample matrices. If stored in the dark at 0-4°C and preserved as given above (if required), aqueous samples may be stored for up to one year. Similarly, if stored in the dark at <-10°C, solid, semi-solid, multi-phase, and tissue samples may be stored for up to one year. (EPA 1613B)

**ACTION :** If holding times are exceeded, the concentrations are considered to be minimum concentrations and the detected results are flagged with "J" = holding times not met, possible low bias. Results not detected above the MDL are flagged "UJ".

If samples were incorrectly preserved flag the detected results are flagged with "J" = value is an estimate and results not detected above the MDL are flagged "UJ".

If holding times are grossly exceeded or the storage conditions are improper the reviewer may flag data "R" – rejected, unusable for any purpose.

**2.0 System Performance Checks**Mass Calibration and Resolution -----→ PFK Resolution  $\geq 10,000$ 

Were the compound pairs in the window defining mixtures determined ?

Is the height of the valley between the 2,3,7,8 isomers and most closely eluting isomer &lt; 25%

ACTION : Failure to meet either the resolution or the retention time window criteria invalidates all calibration or sample data collected during the 12-hour window. Associated data is flagged "R".

| Yes                                 | No                       |
|-------------------------------------|--------------------------|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |

**3.0 Initial Calibration**

ICAL performed before sample analysis ?

Does the initial calibration curve contain 5 points and were all points used for calibration?

Do the ion abundance ratios in standards for all labeled and unlabeled PCDD and PCDF meet method 1613B requirements (Table 9) ?

Are compounds within the SIM windows and does the absolute RT of  $^{13}\text{C}_{12}$ -1,2,3,4-TCDD exceed 25 minutes on the DB-5 column and 15 minutes on the DB-225 column ?

Were the minimum reporting levels met and do all the labeled and unlabeled compounds in CS1 have a S/N greater than 10 ?

Is the average RR %RSD less than 20% for **isotope dilution** method of calibration ?

| Yes                                 | No                       |
|-------------------------------------|--------------------------|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |

ACTION : If any of the above requirements are not met then flag all detected results as "J" and all non-detects as "UJ".

**TABLE 9. THEORETICAL ION ABUNDANCE RATIOS AND QC LIMITS**  
 Method 1613B, October 1994

| Number of Chlorine Atoms | M/Z's Forming Ratio | Theoretical Ratio | Lower QC Limit | Upper QC Limit |
|--------------------------|---------------------|-------------------|----------------|----------------|
| 4 <sup>1</sup>           | M/(M+2)             | 0.77              | 0.65           | 0.89           |
| 5                        | (M+2)/(M+4)         | 1.55              | 1.32           | 1.78           |
| 6                        | (M+2)/(M+4)         | 1.24              | 1.05           | 1.43           |
| 6 <sup>2</sup>           | M/(M+2)             | 0.51              | 0.43           | 0.59           |
| 7                        | (M+2)/(M+4)         | 1.05              | 0.88           | 1.20           |
| 7                        | M/(M+2)             | 0.44              | 0.37           | 0.51           |
| 8                        | (M+2)/(M+4)         | 0.89              | 0.76           | 1.02           |

QC limits represent 15% windows around the theoretical ion abundance ratios.

1. Does not apply to Cl<sub>17</sub>-2,3,7,8-TCDD (cleanup standard).
2. Used for  $^{13}\text{C}_{12}$  -HxCDF only
3. Used for  $^{13}\text{C}_{12}$  -HpCDF only

3.0 Calibration Verification

9/21/02 for RES-01B

Do the ion abundance ratios in standards for all labeled and unlabeled PCDD and PCDF meet method 1613B requirements (Table 9) ?

Are compounds within the SIM windows and does the absolute RT of  $^{13}\text{C}_{12}$ -1,2,3,4-TCDD exceed 25 minutes on the DB-5 column and 15 minutes on the DB-225 column ?

Are the relative retention times (RRTs) within the ICAL limits ?

Were the minimum reporting levels met and do all the labeled and unlabeled compounds in CS3 have a S/N greater than 10 ?

Is the CV RR %RSD within  $\pm 20\%$  of the mean value from the ICAL for **isotope dilution** method of calibration ?

| Yes                                 | No                       |
|-------------------------------------|--------------------------|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |

ACTION : If any of the above requirements are not met then flag all detected results as "J" and all non-detects as "UJ". If the S/N requirements are not met flag all estimated DLs (non-detects) as "R".

4.0 Compound Identification – examined for positive sample results

Are signals for the two exact m/z's present and do they maximize within  $\pm 2$  seconds?

Is the S/N  $\geq 2.5$  for a sample extract or 10 for a calibration standard?

Are the ion abundance ratios from EPA1613B Table 9 within the limits listed below – or within 10% of the most recent CS3 standard?

Are the relative retention time (RRT) ratios from EPA1613B Table 2 within limits?

If the compound was identified as PCDF - is there a signal (with S/N  $\geq 2.5$ ) at the same retention time ( $\pm 2$  seconds) in the PCDPE channel – If YES then the PCDF is not confirmed and is flagged with R.

| Yes                                 | No                       |
|-------------------------------------|--------------------------|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/>            | <input type="checkbox"/> |

Reported as EPMC → 1,2,3,7,8-PCDF

ACTION : Professional judgment is used to determine whether the data are flagged. If any of the signal maximization or RRT identification criteria are not met the results for that isomer should be qualified as "R" because the presence of the isomer cannot be confirmed. If the S/N criteria are not met or the PCDPE S/N is greater than 2.5 then the sample result should be J flagged.



**5.0 Method Blanks**

Was a method blank extracted with every 12-hour sample batch at a frequency of 1 in 20 ?

Yes No

Does the concentration of any analyte exceed the method reporting limit? (Or contract required reporting limit, CRDL) -- except OCDD/OCDF criteria is < 3x RL

Where samples rerun if the method blank did not meet criteria ?

| Method Blank Result | Sample Result      | Action                    |
|---------------------|--------------------|---------------------------|
| < CRDL              | ND                 | no action                 |
|                     | < CRDL             | Report CRDL with Flag "U" |
|                     | > CRDL             | Professional Judgement    |
| > or = CRDL         | < CRDL             | Report CRDL with Flag "U" |
|                     | > CRDL but < blank | Flag "U" or "J"           |
|                     | > CRDL and > blank | Professional Judgement    |
| Gross Contamination | Positive           | Flag "R", unusable        |

Yes No

Was an OPR (on-going precision and recovery) sample that included all analytes analyzed with the sample set?

Does the OPR meet the criteria for %recovery, ion abundance ratio and relative retention times (RRT) ?

ACTION : Results for analytes not meeting the OPR criteria are qualified as "J" or "UJ". If the analyte is not recovered the results are qualified as "R".

**7.0 Second Column Confirmation**

Yes No

Was a positive result for 2,3,7,8-TCDF confirmed on a second column or confirmed after further cleanup and second column analysis?

The primary column result should be reported and used if the identity is confirmed on a second column. The second column must meet all the criteria listed above (ICAL, CV, RTs, etc.) If the result is not confirmed R flag the data.

**8.0 Labeled Compound Recoveries**

Yes No

Is the recovery of each C-13 labeled PCDF and PCDD isomer within 25%-150% ?

- 411 = 654

Is the recovery of  $^{13}\text{C}_{12}$ -1,2,3,4,-TCDD within 25%-150% ?

|   |  |
|---|--|
| ✓ |  |
| ✓ |  |

Is the recovery of  $^{13}\text{C}_{12}$ -1,2,3,7,8,9-HxCDD within 25%-150% ?

655 = 288

ACTION : If any C-13 labeled standard is outside the criteria then qualify detected results as "J" and non-detects as "UJ".

if >150% no flags

ACTION : There are no method criteria for these recoveries. Professional judgement should be used if these criteria are exceeded. If the labeled standard is outside the criteria then qualify detected results as "J". If the %R is less than 25% qualify non-detects as "UJ" and if the %R is < 10% qualify non-detects as "R".

### 9.0 Project Quality Assurance Samples


Is the Field Duplicate RPD < 35%

Yes No

|      |  |
|------|--|
| NA → |  |
| NA → |  |

Are Equipment Blanks (if applicable) < MRL ?

ACTION : Professional judgment is used to determine whether the data are flagged.

|                    |   |
|--------------------|---|
| Project Name:      | Taylor Lumber Field Investigation   |
| Project Number:    | 165241.AN.01  |
| SDG Batch:         | 580688  |
| Sampling Date(s):  | 7/29, 7/30, 7/31, 8/1, 8/2  |
| Matrix:            | Soil  |
| Number of Samples: | 24  |
| Sample Field IDs:  | WF-12E, WF-12U, WF-DUP3, RES-03A, RES-01B, RES-DUP, RES-04A, RES-02B, RES-05A, CS-3, DS-12, DS-04, RS-06, DS-13, DS-15, EF-10, EF-06, EF-01, WF-05U, WF-05U, RS-03, RS-DUP, RS-04, RS-09, RS-09MS, RS-09MSD |
| Reviewed by:       |   |
| Date:              | 24 Sept 2002  |

### 1.0 Holding Time and Preservation of Samples

Have the following holding times been met ?

Water, 30 days from sample collection to extraction (7 days for CWA or SWDA samples)

Soil/sediment, 30 days from sample collection to extraction  
rec'd 8/1 ext 8/23

All samples, 30 days from extraction to analysis  
analysis 8/28-8/29

Were the samples correctly preserved ?

Water, 4°C in the dark, Chlorine residual (if any) neutralized

Soil/sediment, 4°C in the dark

| Yes   | No |
|-------|----|
| N/A → |    |
| X     |    |
| X     |    |
|       |    |
| N/A → |    |
| X     |    |

Note: Extraction holding times are listed as recommended. There are no demonstrated maximum holding times associated with CDDs/CDFs in aqueous, solid, semi-solid, tissues, or other sample matrices. If stored in the dark at 0-4°C and preserved as given above (if required), aqueous samples may be stored for up to one year. Similarly, if stored in the dark at <-10°C, solid, semi-solid, multi-phase, and tissue samples may be stored for up to one year. (EPA 1613B)

**ACTION :** If holding times are exceeded, the concentrations are considered to be minimum concentrations and the detected results are flagged with "J" = holding times not met, possible low bias. Results not detected above the MDL are flagged "UJ".

If samples were incorrectly preserved flag the detected results are flagged with "J" = value is an estimate and results not detected above the MDL are flagged "UJ".

If holding times are grossly exceeded or the storage conditions are improper the reviewer may flag data "R" – rejected, unusable for any purpose.

**2.0 System Performance Checks**Mass Calibration and Resolution -----> PFK Resolution  $\geq 10,000$ 

Were the compound pairs in the window defining mixtures determined?

Is the height of the valley between the 2,3,7,8 isomers and most closely eluting isomer &lt; 25%?

ACTION : Failure to meet either the resolution or the retention time window criteria invalidates all calibration or sample data collected during the 12-hour window. Associated data is flagged "R".

Yes No

|                                      |  |
|--------------------------------------|--|
| X                                    |  |
| w/exception<br>of OCDD/OCDF for ICAL |  |
| X                                    |  |

SF56072 &  
WF56142**3.0 Initial Calibration**

ICAL performed before sample analysis?

Does the initial calibration curve contain 5 points and were all points used for calibration?

Do the ion abundance ratios in standards for all labeled and unlabeled PCDD and PCDF meet method 1613B requirements (Table 9)?

Are compounds within the SIM windows and does the absolute RT of  $^{13}\text{C}_{12}$ -1,2,3,4-TCDD exceed 25 minutes on the DB-5 column and 15 minutes on the DB-225 column?

Were the minimum reporting levels met and do all the labeled and unlabeled compounds in CS1 have a S/N greater than 10?

Is the average RR %RSD less than 20% for **isotope dilution** method of calibration?

Yes No

|   |  |
|---|--|
| X |  |
| X |  |
| X |  |
| X |  |
| X |  |
| X |  |

ACTION : If any of the above requirements are not met then flag all detected results as "J" and all non-detects as "UJ".

**TABLE 9. THEORETICAL ION ABUNDANCE RATIOS AND QC LIMITS**

Method 1613B, October 1994

| Number of Chlorine Atoms | M/Z's Forming Ratio | Theoretical Ratio | Lower QC Limit | Upper QC Limit |
|--------------------------|---------------------|-------------------|----------------|----------------|
| 4 <sup>1</sup>           | M/(M+2)             | 0.77              | 0.65           | 0.89           |
| 5                        | (M+2)/(M+4)         | 1.55              | 1.32           | 1.78           |
| 6                        | (M+2)/(M+4)         | 1.24              | 1.05           | 1.43           |
| 6 <sup>2</sup>           | M/(M+2)             | 0.51              | 0.43           | 0.59           |
| 7                        | (M+2)/(M+4)         | 1.05              | 0.88           | 1.20           |
| 7                        | M/(M+2)             | 0.44              | 0.37           | 0.51           |
| 8                        | (M+2)/(M+4)         | 0.89              | 0.76           | 1.02           |

QC limits represent 15% windows around the theoretical ion abundance ratios.

- Does not apply to Cl37-2,3,7,8-TCDD (cleanup standard).
- Used for  $^{13}\text{C}_{12}$ -HxCDF only
- Used for  $^{13}\text{C}_{12}$ -HpCDF only

ICAL  
SF56072  
WF56142

### 3.0 Calibration Verification

Do the ion abundance ratios in standards for all labeled and unlabeled PCDD and PCDF meet method 1613B requirements (Table 9) ?

Are compounds within the SIM windows and does the absolute RT of  $^{13}\text{C}_{12}$ -1,2,3,4-TCDD exceed 25 minutes on the DB-5 column and 15 minutes on the DB-225 column ?

Are the relative retention times (RRTs) within the ICAL limits ?

Were the minimum reporting levels met and do all the labeled and unlabeled compounds in CS3 have a S/N greater than 10 ?

Is the CV RR %RSD within  $\pm 20\%$  of the mean value from the ICAL for isotope dilution method of calibration ?  $\pm 30\%$  for labeled compds.

| Yes       | No |
|-----------|----|
| X         |    |
| X         |    |
| X         |    |
| X         |    |
| see below |    |

ACTION : If any of the above requirements are not met then flag all detected results as "J" and all non-detects as "UJ". If the S/N requirements are not met flag all estimated DLs (non-detects) as "R".

8/28/02  
8/29/02  
8/28/02  
8/29/02

5024062 CONXAL 10

0023119  
5024076  
5024090

$^{12}\text{C}_{12}$  0000 20 -32.9%

8/28/02 W021339 CONXAL10  
8/28/02 W021342  
8/30/02 0023133

13C<sub>12</sub>-2378-TCF  
17 20 23.9%  
→ 20 22.6  
OK

### 4.0 Compound Identification - examined for positive sample results

Are signals for the two exact m/z's present and do they maximize within  $\pm 2$  seconds?

Is the S/N  $\geq 2.5$  for a sample extract or 10 for a calibration standard?

Are the ion abundance ratios from EPA1613B Table 9 within the limits listed below - or within 10% of the most recent CS3 standard?

Are the relative retention time (RRT) ratios from EPA1613B Table 2 within limits?

If the compound was identified as PCDF - is there a signal (with S/N  $\geq 2.5$ ) at the same retention time ( $\pm 2$  seconds) in the PCDPE channel - If YES then the PCDF is not confirmed and is flagged with R.

| Yes | No |
|-----|----|
| X   |    |
| X   |    |
| X   |    |
| X   |    |

Criteria for labeled compds. is  $\pm 30\%$

ACTION : Professional judgment is used to determine whether the data are flagged. If any of the signal maximization or RRT identification criteria are not met the results for that isomer should be qualified as "R" because the presence of the isomer cannot be confirmed. If the S/N criteria are not met or the PCDPE S/N is greater than 2.5 then the sample result should be J flagged.

**5.0 Method Blanks**

Was a method blank extracted with every 12-hour sample batch at a frequency of 1 in 20 ?

Yes

No

Does the concentration of any analyte exceed the method reporting limit? (Or contract required reporting limit, CRDL) -- except OCDD/OCDF criteria is < 3x RL

Where samples rerun if the method blank did not meet criteria ?

| Method Blank Result | Sample Result      | Action                    |
|---------------------|--------------------|---------------------------|
| < CRDL              | ND                 | no action                 |
|                     | < CRDL             | Report CRDL with Flag "U" |
|                     | > CRDL             | Professional Judgement    |
| > or = CRDL         | < CRDL             | Report CRDL with Flag "U" |
|                     | > CRDL but < blank | Flag "U" or "J"           |
|                     | > CRDL and > blank | Professional Judgement    |
| Gross Contamination | Positive           | Flag "R", unusable        |

TLI Blank S024064

1,2,3,4,6,7,8,9 - 0.00 1.4 PS15  
Total PCDD 0.12

**6.0 Laboratory Control Samples**

Was an OPR (on-going precision and recovery) sample that included all analytes analyzed with the sample set?

Yes

No

Does the OPR meet the criteria for %recovery, ion abundance ratio and relative retention times (RRT) ?

ACTION : Results for analytes not meeting the OPR criteria are qualified as "J" or "UJ". If the analyte is not recovered the results are qualified as "R".

**7.0 Second Column Confirmation**

Was a positive result for 2,3,7,8-TCDF confirmed on a second column or confirmed after further cleanup and second column analysis?

Yes

No

The primary column result should be reported and used if the identity is confirmed on a second column. The second column must meet all the criteria listed above (ICAL, CV, RTs, etc.) If the result is not confirmed R flag the data.

**8.0 Labeled Compound Recoveries**

Is the recovery of each C-13 labeled PCDF and PCDD isomer within 25%-150% ?

Yes

No

Is the recovery of  $^{13}\text{C}_{12}$ -1,2,3,4,-TCDD within 25%-150% ?

|   |  |
|---|--|
| X |  |
| X |  |

Is the recovery of  $^{13}\text{C}_{12}$ -1,2,3,7,8,9-HxCDD within 25%-150% ?

ACTION : If any C-13 labeled standard is outside the criteria then qualify detected results as "J" and non-detects as "UJ".

ACTION : There are no method criteria for these recoveries. Professional judgement should be used if these criteria are exceeded. If the labeled standard is outside the criteria then qualify detected results as "J". If the %R is less than 25% qualify non-detects as "UJ" and if the %R is < 10% qualify non-detects as "R".

### 9.0 Project Quality Assurance Samples

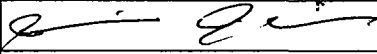
Is the Field Duplicate RPD < 35% *what is native sample to RS-Dup?*

Yes No

|       |  |
|-------|--|
|       |  |
| N/A → |  |

Are Equipment Blanks (if applicable) < MRL ?

ACTION : Professional judgment is used to determine whether the data are flagged.

|                    |   |
|--------------------|---|
| Project Name:      | Taylor Lumber   |
| Project Number:    | 165241  |
| SDG Batch:         | 58068Brl  |
| Sampling Date(s):  | 8/2   |
| Matrix:            | Soil Method 8290  |
| Number of Samples: | 2   |
| Sample Field IDs:  | 25-04 , 25-09   |
| Reviewed by:       |  |
| Date:              | 25 Sept 2002  |

### 1.0 Holding Time and Preservation of Samples

Have the following holding times been met ?

Water, 30 days from sample collection to extraction (7 days for CWA or SWDA samples)  
 rec'd 8/2/02 ext 8/31  
 Soil/sediment, 30 days from sample collection to extraction  
 analyzed 9/9/02  
 All samples, 30 days from extraction to analysis

Yes No

|       |  |
|-------|--|
| N/A → |  |
| X     |  |
| X     |  |
|       |  |
| N/A → |  |
| X     |  |

Were the samples correctly preserved ?

Water, 4°C in the dark, Chlorine residual (if any) neutralized

Soil/sediment , 4°C in the dark

Note: Extraction holding times are listed as recommended. There are no demonstrated maximum holding times associated with CDDs/CDFs in aqueous, solid, semi-solid, tissues, or other sample matrices. If stored in the dark at 0-4°C and preserved as given above (if required), aqueous samples may be stored for up to one year. Similarly, if stored in the dark at <-10°C, solid, semi-solid, multi-phase, and tissue samples may be stored for up to one year. (EPA 1613B)

**ACTION :** If holding times are exceeded, the concentrations are considered to be minimum concentrations and the detected results are flagged with "J" = holding times not met, possible low bias. Results not detected above the MDL are flagged "UJ".

If samples were incorrectly preserved flag the detected results are flagged with "J" = value is an estimate and results not detected above the MDL are flagged "UJ".

If holding times are grossly exceeded or the storage conditions are improper the reviewer may flag data "R" – rejected, unusable for any purpose.



**2.0 System Performance Checks**Mass Calibration and Resolution -----→ PFK Resolution  $\geq 10,000$ 

Were the compound pairs in the window defining mixtures determined ?

Is the height of the valley between the 2,3,7,8 isomers and most closely eluting isomer &lt; 25%

ACTION : Failure to meet either the resolution or the retention time window criteria invalidates all calibration or sample data collected during the 12-hour window. Associated data is flagged "R".

| Yes | No                           |
|-----|------------------------------|
| X   |                              |
| X   | No OCDF, OCDF<br>WDM defined |
| X   |                              |

**3.0 Initial Calibration**

JF56142

MIT3 6/14/02 ICAL performed before sample analysis ?

Does the initial calibration curve contain 5 points and were all points used for calibration?

Do the ion abundance ratios in standards for all labeled and unlabeled PCDD and PCDF meet method 1613B requirements (Table 9) ?

Are compounds within the SIM windows and does the absolute RT of  $^{13}\text{C}_{12}$ -1,2,3,4-TCDD exceed 25 minutes on the DB-5 column and 15 minutes on the DB-225 column ?

Were the minimum reporting levels met and do all the labeled and unlabeled compounds in CS1 have a S/N greater than 10 ?

Is the average RR %RSD less than 20% for **isotope dilution** method of calibration ?

| Yes | No |
|-----|----|
| X   |    |
| X   |    |
| X   |    |
| X   |    |
| X   |    |
| X   |    |

ACTION : If any of the above requirements are not met then flag all detected results as "J" and all non-detects as "UJ".

**TABLE 9. THEORETICAL ION ABUNDANCE RATIOS AND QC LIMITS**  
Method 1613B, October 1994

| Number of Chlorine Atoms | M/Z's Forming Ratio | Theoretical Ratio | Lower QC Limit | Upper QC Limit |
|--------------------------|---------------------|-------------------|----------------|----------------|
| 4 <sup>1</sup>           | M/(M+2)             | 0.77              | 0.65           | 0.89           |
| 5                        | (M+2)/(M+4)         | 1.55              | 1.32           | 1.78           |
| 6                        | (M+2)/(M+4)         | 1.24              | 1.05           | 1.43           |
| 6 <sup>2</sup>           | M/(M+2)             | 0.51              | 0.43           | 0.59           |
| 7                        | (M+2)/(M+4)         | 1.05              | 0.88           | 1.20           |
| 7                        | M/(M+2)             | 0.44              | 0.37           | 0.51           |
| 8                        | (M+2)/(M+4)         | 0.89              | 0.76           | 1.02           |

QC limits represent 15% windows around the theoretical ion abundance ratios.

- Does not apply to Cl<sub>37</sub>-2,3,7,8-TCDD (cleanup standard).
- Used for  $^{13}\text{C}_{12}$ -HxCDF only
- Used for  $^{13}\text{C}_{12}$ -HpCDF only

**3.0 Calibration Verification**

Do the ion abundance ratios in standards for all labeled and unlabeled PCDD and PCDF meet method 1613B requirements (Table 9) ?

Are compounds within the SIM windows and does the absolute RT of  $^{13}\text{C}_{12}$ -1,2,3,4-TCDD exceed 25 minutes on the DB-5 column and 15 minutes on the DB-225 column ?

Are the relative retention times (RRTs) within the ICAL limits ?

Were the minimum reporting levels met and do all the labeled and unlabeled compounds in CS3 have a S/N greater than 10 ?

Is the CV RR %RSD within  $\pm 20\%$  of the mean value from the ICAL for **isotope dilution** method of calibration ?

| Yes            | No |
|----------------|----|
| X              |    |
| X              |    |
| X              |    |
| X              |    |
| See below<br>X |    |

**ACTION :** If any of the above requirements are not met then flag all detected results as "J" and all non-detects as "UJ". If the S/N requirements are not met flag all estimated DLs (non-detects) as "R".

W140602 9/9/02 cancel 10.0  $^{13}\text{C}_{12}$ -PCDF 123  $\delta\text{D} = -23.2\text{‰}$ ;  $^{13}\text{C}_{12}$ -PCDD 123  $\delta\text{D} = -21.9\text{‰}$   
 W021408 9/10/02  $^{13}\text{C}_{12}$ -PCDF 123  $\delta\text{D} = -22.9\text{‰}$ ;  $^{13}\text{C}_{12}$ -PCDD 123  $\delta\text{D} = -21.0\text{‰}$

labeled compd criteria =  $\pm 30\%$

**4.0 Compound Identification – examined for positive sample results**

Are signals for the two exact m/z's present and do they maximize within  $\pm 2$  seconds?

Is the S/N  $\geq 2.5$  for a sample extract or 10 for a calibration standard?

Are the ion abundance ratios from EPA1613B Table 9 within the limits listed below – or within 10% of the most recent CS3 standard?

Are the relative retention time (RRT) ratios from EPA1613B Table 2 within limits?

If the compound was identified as PCDF - is there a signal (with S/N  $\geq 2.5$ ) at the same retention time ( $\pm 2$  seconds) in the PCDPE channel – If YES then the PCDF is not confirmed and is flagged with R.

| Yes | No |
|-----|----|
| X   |    |
| X   |    |
| X   |    |
| X   |    |
| X   |    |

**ACTION :** Professional judgment is used to determine whether the data are flagged. If any of the signal maximization or RRT identification criteria are not met the results for that isomer should be qualified as "R" because the presence of the isomer cannot be confirmed. If the S/N criteria are not met or the PCDPE S/N is greater than 2.5 then the sample result should be J flagged.

**5.0 Method Blanks**

Was a method blank extracted with every 12-hour sample batch at a frequency of 1 in 20 ?

Yes

No

|                |  |
|----------------|--|
| X              |  |
| see below<br>X |  |
| X              |  |

Does the concentration of any analyte exceed the method reporting limit? (Or contract required reporting limit, CRDL) -- except OCDD/OCDF criteria is  $< 3 \times \text{RL}$

Where samples rerun if the method blank did not meet criteria ?

| Method Blank Result | Sample Result      | Action                    |
|---------------------|--------------------|---------------------------|
| < CRDL              | ND                 | no action                 |
|                     | < CRDL             | Report CRDL with Flag "U" |
|                     | > CRDL             | Professional Judgement    |
| > or = CRDL         | < CRDL             | Report CRDL with Flag "U" |
|                     | > CRDL but < blank | Flag "U" or "J"           |
|                     | > CRDL and > blank | Professional Judgement    |
| Gross Contamination | Positive           | Flag "R", unusable        |

1/4/02 TL1 Blank 1140701 OCDD 4.8

**6.0 Laboratory Control Samples**

Was an OPR (on-going precision and recovery) sample that included all analytes analyzed with the sample set?

Yes

No

|   |  |
|---|--|
| X |  |
| X |  |

Does the OPR meet the criteria for %recovery, ion abundance ratio and relative retention times (RRT) ?

ACTION : Results for analytes not meeting the OPR criteria are qualified as "J" or "UJ". If the analyte is not recovered the results are qualified as "R".

**7.0 Second Column Confirmation**

Was a positive result for 2,3,7,8-TCDF confirmed on a second column or confirmed after further cleanup and second column analysis?

Yes

No

|     |  |
|-----|--|
| N/A |  |
|-----|--|

The primary column result should be reported and used if the identity is confirmed on a second column. The second column must meet all the criteria listed above (ICAL, CV, RTs, etc.) If the result is not confirmed R flag the data.

**8.0 Labeled Compound Recoveries**

Is the recovery of each C-13 labeled PCDF and PCDD isomer within 25%-150% ?

Yes

No

|   |  |
|---|--|
| X |  |
|---|--|

Is the recovery of  $^{13}\text{C}_{12}$ -1,2,3,4,-TCDD within 25%-150% ?

|   |  |
|---|--|
| X |  |
| X |  |

Is the recovery of  $^{13}\text{C}_{12}$ -1,2,3,7,8,9-HxCDD within 25%-150% ?

ACTION : If any C-13 labeled standard is outside the criteria then qualify detected results as "J" and non-detects as "UJ".

ACTION : There are no method criteria for these recoveries. Professional judgement should be used if these criteria are exceeded. If the labeled standard is outside the criteria then qualify detected results as "J". If the %R is less than 25% qualify non-detects as "UJ" and if the %R is < 10% qualify non-detects as "R".

#### 9.0 Project Quality Assurance Samples

Is the Field Duplicate RPD < 35%

| Yes | No |
|-----|----|
| X   |    |
| N/A | →  |

Are Equipment Blanks (if applicable) < MRL ?

ACTION : Professional judgment is used to determine whether the data are flagged.

SDG 58068A - LCS/LCSD % recoveries calculated without blank subtraction used by TLI

| Compound      | nominal (pg/g) | LCS  | %R   | LCSD | %R   | RPD  |
|---------------|----------------|------|------|------|------|------|
| 2378-TCDD     | 40             | 47.5 | 119% | 52.3 | 131% | -10% |
| 12378-PeCDD   | 200            | 256  | 128% | 273  | 137% | -6%  |
| 123478-HxCDD  | 200            | 197  | 99%  | 212  | 106% | -7%  |
| 123678-HxCDD  | 200            | 210  | 105% | 218  | 109% | -4%  |
| 123789-HxCDD  | 200            | 202  | 101% | 221  | 111% | -9%  |
| 1234678-HpCDD | 200            | 205  | 103% | 217  | 109% | -6%  |
| OCDD          | 400            | 356  | 89%  | 388  | 97%  | -9%  |
| 2378-TCDF     | 40             | 52.9 | 132% | 55.6 | 139% | -5%  |
| 12378-PeCDF   | 200            | 254  | 127% | 261  | 131% | -3%  |
| 23478-PeCDF   | 200            | 244  | 122% | 260  | 130% | -6%  |
| 123478-HxCDF  | 200            | 195  | 98%  | 213  | 107% | -9%  |
| 123678-HxCDF  | 200            | 213  | 107% | 231  | 116% | -8%  |
| 234678-HxCDF  | 200            | 205  | 103% | 228  | 114% | -11% |
| 123789-HxCDF  | 200            | 165  | 83%  | 194  | 97%  | -16% |
| 1234678-HpCDF | 200            | 256  | 128% | 265  | 133% | -3%  |
| 1234789-HpCDF | 200            | 176  | 88%  | 199  | 100% | -12% |
| OCDF          | 400            | 314  | 79%  | 349  | 87%  | -11% |

criteria = 70%-130%

all shaded flag J/UJ

9-17-02 SFE

## Echols, Scott/CVO

---

From: Lauren E. Tochacek [tochacek@trianglelabs.com]  
Sent: December 03, 2002 12:34 PM  
To: Echols, Scott/CVO  
Subject: Re: Question about previous SDG for Taylor Lumber

Scott,

I have looked into this project and may have come up with an answer.

8/29/02 There was a non-conformance for the two samples for possible OCDD contamination. This data most likely was not QC reviewed yet and sent to me directly from mass spec. I said to re-extract the two samples because of the contamination.

8/30/02 Another non-conformance for possible lab contamination for RS-09 only. This non-conformance was sent to me from data review and therefore it had gone through QC review. I accepted this possible lab contamination because it was well below target detection limits.

By this time, the blank may have turned out to be clean since it went through QC inspection. But since I had all ready set the samples up for re-extraction, RS-04 and RS-09 were all ready back in the lab gearing up for re-extraction. After responding to this non-conformance on 8/30 I had said to ship the data. This is how you may have received the first data package containing RS-04 and RS-09. Data was shipped 8/30/02.

9/13/02 58068Br1 had a non-conformance for both samples of possible contamination. I had spoken to you about this and you had agreed to accept it. Data was shipped 9/13/02.

So...Both data sets are valid. I am curious as to how different the sample sets are, but it wouldn't surprise me if they were at all different. Unfortunately, these are soils and therefore, they aren't always all that homogeneous.

If you have any questions or need additional information, please do not hesitate to ask.

Sincerely,

From: "Echols, Scott/CVO" <SEchols@CH2M.com>  
Date: 2002/12/03 Tue PM 02:26:45 EST  
To: "Lauren E. Tochacek" <tochacek@trianglelabs.com>  
Subject: Question about previous SDG for Taylor Lumber

58068B  
Br1 } reported  
in  
each

Hi Lauren,

I am wrapping up a summary of the dioxin data for Taylor Lumber and came across something my notes were incomplete on.

For SDG 58068B samples 332-56-23 (RS-04) and 332-56-24 (RS-09) were reported. These samples were then also re-extracted and re-reported in SDG 58068Br1. The first set of data were fairly clean and the second set had higher levels. In both cases the blank was clean. Unfortunately I didn't keep good enough notes to help me remember why these were re-extracted and whether the original or re-extracted data should be retained. It may just be something in the case narratives that I have over-looked. I'm hoping you can jog my memory.

Thanks for any insights you can provide on this.

Regards,

Scott

Scott Echols

Project Chemist  
CH2M HILL  
Corvallis, OR

541-758-0235 ext. 3148  
sechols@ch2m.com

Lauren E. Tochacek  
Triangle Laboratories, Inc.  
2445 South Alston Avenue  
Durham, NC 27713  
919-281-4032  
tochacek@trianglelabs.com

| SampleId | SampleType | LabLotId | Parameter    | LabResult | LabQualifie | MethodDet | PracticalQi | Units |
|----------|------------|----------|--------------|-----------|-------------|-----------|-------------|-------|
| RS-09    | N          | 58068Br1 | TCDF         | 2.1       | MX          |           | 1           | pg/g  |
| RS-09    | N          | 58068Br1 | PECDF        | 2.3       | M           |           | 5           | pg/g  |
| RS-09    | N          | 58068Br1 | PECDF23478   | U         |             |           | 5           | pg/g  |
| RS-09    | N          | 58068Br1 | PECDF12378   | U         |             |           | 5           | pg/g  |
| RS-09    | N          | 58068Br1 | TCDD2378CL37 | 10        |             |           |             | pg/g  |
| RS-09    | N          | 58068Br1 | TCDD         | 0.5       | M           |           | 1           | pg/g  |
| RS-09    | N          | 58068Br1 | TCDF2378     | U         |             |           | 1           | pg/g  |
| RS-09    | N          | 58068Br1 | PECDD12378   | U         |             |           | 5           | pg/g  |
| RS-09    | N          | 58068Br1 | TCDD2378     | U         |             |           | 1           | pg/g  |
| RS-09    | N          | 58068Br1 | OCDD         | 88.5      | B           |           | 9.9         | pg/g  |
| RS-09    | N          | 58068Br1 | OCDF         | 1.8       | MJ          |           | 9.9         | pg/g  |
| RS-09    | N          | 58068Br1 | HPCDD1234678 | 13.2      |             |           | 5           | pg/g  |
| RS-09    | N          | 58068Br1 | HPCDF        | 4.3       |             |           | 5           | pg/g  |
| RS-09    | N          | 58068Br1 | HPCDF1234789 | U         |             |           | 5           | pg/g  |
| RS-09    | N          | 58068Br1 | HPCDF1234678 | 1.4       | J           |           | 5           | pg/g  |
| RS-09    | N          | 58068Br1 | HXCDD        | 4.2       |             |           | 5           | pg/g  |
| RS-09    | N          | 58068Br1 | HXCDF234678  | U         |             |           | 5           | pg/g  |
| RS-09    | N          | 58068Br1 | HPCDD        | 25.5      |             |           | 5           | pg/g  |
| RS-09    | N          | 58068Br1 | PECDD        | U         |             |           | 5           | pg/g  |
| RS-09    | N          | 58068Br1 | HXCDD123789  | 0.43      | J           |           | 5           | pg/g  |
| RS-09    | N          | 58068Br1 | HXCDF123678  | U         |             |           | 5           | pg/g  |
| RS-09    | N          | 58068Br1 | HXCDF123789  | U         |             |           | 5           | pg/g  |
| RS-09    | N          | 58068Br1 | HXCDF        | 2.9       | M           |           | 5           | pg/g  |
| RS-09    | N          | 58068Br1 | HXCDD123478  | U         |             |           | 5           | pg/g  |
| RS-09    | N          | 58068Br1 | HXCDD123678  | 0.71      | J           |           | 5           | pg/g  |
| RS-09    | N          | 58068Br1 | HXCDF123478  | U         |             |           | 5           | pg/g  |



| SampleId | SampleType | LabLotId | Parameter    | LabResult | LabQualifie | MethodDet | PracticalQt |
|----------|------------|----------|--------------|-----------|-------------|-----------|-------------|
| RS-09    | N          | 58068B   | TCDF2378     | U         |             | 0.51      | 1           |
| RS-09    | N          | 58068B   | TCDF         | U         |             | 0.51      | 1           |
| RS-09    | N          | 58068B   | TCDD2378     | 0.41      |             | 0.7       | 1           |
| RS-09    | N          | 58068B   | TCDD         | 0.41      |             | 0.7       | 1           |
| RS-09    | N          | 58068B   | TCDD2378CL37 | 15.1      |             |           |             |
| RS-09    | N          | 58068B   | PECDF12378   | 0.67 J    |             | 0.95      | 5           |
| RS-09    | N          | 58068B   | PECDF23478   | 0.45 MJ   |             | 1         | 5           |
| RS-09    | N          | 58068B   | PECDF        | 1.1 M     |             | 0.95      | 5           |
| RS-09    | N          | 58068B   | PECDD12378   | 0.49 MJ   |             | 0.49      | 5           |
| RS-09    | N          | 58068B   | PECDD        | 0.49 M    |             | 0.49      | 5           |
| RS-09    | N          | 58068B   | HXCDF123478  | 0.38 MJ   |             | 0.75      | 5           |
| RS-09    | N          | 58068B   | HXCDF123678  | 0.31 MJ   |             | 1         | 5           |
| RS-09    | N          | 58068B   | HXCDF234678  | 0.36 J    |             | 2.89      | 5           |
| RS-09    | N          | 58068B   | HXCDF123789  | 0.6 MJ    |             | 0.39      | 5           |
| RS-09    | N          | 58068B   | HXCDF        | 1.6 M     |             | 0.39      | 5           |
| RS-09    | N          | 58068B   | HXCDD123478  | 0.34 MJ   |             | 0.94      | 5           |
| RS-09    | N          | 58068B   | HXCDD123678  | 0.44 MJ   |             | 1.5       | 5           |
| RS-09    | N          | 58068B   | HXCDD123789  | 0.46 MJ   |             | 1.4       | 5           |
| RS-09    | N          | 58068B   | HXCDD        | 1.2 M     |             | 0.94      | 5           |
| RS-09    | N          | 58068B   | HPCDF1234678 | U         |             | 2         | 5           |
| RS-09    | N          | 58068B   | HPCDF1234789 | U         |             | 1.7       | 5           |
| RS-09    | N          | 58068B   | HPCDF        | U         |             | 1.7       | 5           |
| RS-09    | N          | 58068B   | HPCDD1234678 | 1.4 J     |             | 1.1       | 5           |
| RS-09    | N          | 58068B   | HPCDD        | 2.5       |             | 1.1       | 5           |
| RS-09    | N          | 58068B   | OCDF         | U         |             | 4.29      | 10          |
| RS-09    | N          | 58068B   | OCDD         | 7.2 JB    |             | 2.59      | 10          |

**Echols, Scott/CVO**

**From:** Echols, Scott/CVO  
**Sent:** September 27, 2002 3:33 PM  
**To:** Larson, Trish/CVO  
**Cc:** Strauss, Robin/CVO  
**Subject:** Taylor Field Investigation Dioxin Data Flags

Trish,

Here are the flags to apply to the Dioxin data.

Sample RES-01B in SDG 58068Ar2, Flag -- all detects as J, non-detects as UJ

Here are the flags to be applied globally to all samples in the indicated SDG for method blank contamination:

| SDG    | Compound      | Blank conc (pg/g) | Blank Qual | Action for Sample Results < RL | Action for Sample Results > RL   |
|--------|---------------|-------------------|------------|--------------------------------|--|
| 58058A | 12378-PeCDD   | 0.27              | J          | Flag as U and retain value     | No action  |
| 58058A | 123478-HxCDD  | 0.45              | J          | Flag as U and retain value     | No action  |
| 58058A | 123678-HxCDD  | 4.6               | J          | Flag as U and retain value     | No action  |
| 58058A | 123789-HxCDD  | 1.4               | J          | Flag as U and retain value     | No action  |
| 58058A | 1234678-HpCDD | 133               | =          | Flag as U and retain value     | <ul style="list-style-type: none"> <li>• Qualify all results &lt; 665 as U and retain result.</li> <li>• Flag all results &gt; 665 as J</li> </ul>   |
| 58058A | OCDD          | 1230              | =          | Flag as U and retain value     | <ul style="list-style-type: none"> <li>• Qualify all results &lt; 6150 as U and retain result.</li> <li>• Flag all results &gt; 6150 as J</li> </ul> |
| 58058A | 23478-PeCDF   | 0.18              | EMPC-J     | Flag as U and retain value     | No action  |
| 58058A | 123478-HxCDF  | 0.8               | J          | Flag as U and retain value     | No action  |
| 58058A | 123678-HxCDF  | 0.33              | EMPC-J     | Flag as U and retain value     | No action  |
| 58058A | 234678-HxCDF  | 0.69              | EMPC-J     | Flag as U and retain value     | No action  |
| 58058A | 1234678-HpCDF | 9.8               | =          | Flag as U and retain value     | <ul style="list-style-type: none"> <li>• Qualify all results &lt; 49 as U and retain result.</li> <li>• Flag all results &gt; 49 as J</li> </ul>     |
| 58058A | OCDF          | 28.2              | =          | Flag as U and retain value     | <ul style="list-style-type: none"> <li>• Qualify all results &lt; 141 as U and retain result.</li> <li>• Flag all results &gt; 141 as J</li> </ul>   |
|        |               |                   |            |                                |  |

|          |               |      |   |                            |           |
|----------|---------------|------|---|----------------------------|-----------|
| 58068B   | OCDD          | 1.4  | J | Flag as U and retain value | No action |
| 58068Br1 | OCDD          | 4.8  | J | Flag as U and retain value | No action |
| 58068Ar1 | 1234678-HpCDD | 0.57 | J | Flag as U and retain value | No action |
| 58068Ar1 | OCDD          | 4.8  | J | Flag as U and retain value | No action |

Thats all at this point. I will bring the marked up Form 1's from CLP work to you.  
Scott

Scott Echols

Project Chemist  
CH2M HILL  
Corvallis, OR

541-758-0235 ext. 3148  
sechols@ch2m.com

10/01/2002

| SampleId | SampleType | LabLotId | Parameter    | LabResult | LabQualifie | MethodDet | PracticalQt | Units |
|----------|------------|----------|--------------|-----------|-------------|-----------|-------------|-------|
| RS-04    | N          | 58068Br1 | HPCDF1234789 | U         |             |           | 5           | pg/g  |
| RS-04    | N          | 58068Br1 | HXCDD123678  | 1.5 MJ    |             |           | 5           | pg/g  |
| RS-04    | N          | 58068Br1 | HXCDD123789  | 1 J       |             |           | 5           | pg/g  |
| RS-04    | N          | 58068Br1 | HXCDD        | 9.2 M     |             |           | 5           | pg/g  |
| RS-04    | N          | 58068Br1 | HPCDF1234678 | 2.9 J     |             |           | 5           | pg/g  |
| RS-04    | N          | 58068Br1 | HXCDD123478  | U         |             |           | 5           | pg/g  |
| RS-04    | N          | 58068Br1 | HPCDF        | 9.5       |             |           | 5           | pg/g  |
| RS-04    | N          | 58068Br1 | HPCDD1234678 | 31.5      |             |           | 5           | pg/g  |
| RS-04    | N          | 58068Br1 | HPCDD        | 61        |             |           | 5           | pg/g  |
| RS-04    | N          | 58068Br1 | OCDF         | 6.6 J     |             |           | 9.9         | pg/g  |
| RS-04    | N          | 58068Br1 | OCDD         | 171       |             |           | 9.9         | pg/g  |
| RS-04    | N          | 58068Br1 | TCDD         | U         |             |           | 1           | pg/g  |
| RS-04    | N          | 58068Br1 | TCDF2378     | U         |             |           | 1           | pg/g  |
| RS-04    | N          | 58068Br1 | TCDF         | 1.4 MX    |             |           | 1           | pg/g  |
| RS-04    | N          | 58068Br1 | PECDF23478   | U         |             |           | 5           | pg/g  |
| RS-04    | N          | 58068Br1 | TCDD2378     | U         |             |           | 1           | pg/g  |
| RS-04    | N          | 58068Br1 | TCDD2378CL37 | 11.2      |             |           |             | pg/g  |
| RS-04    | N          | 58068Br1 | PECDF12378   | U         |             |           | 5           | pg/g  |
| RS-04    | N          | 58068Br1 | PECDF        | 5.3 M     |             |           | 5           | pg/g  |
| RS-04    | N          | 58068Br1 | PECDD12378   | U         |             |           | 5           | pg/g  |
| RS-04    | N          | 58068Br1 | HXCDF        | 6.9 MX    |             |           | 5           | pg/g  |
| RS-04    | N          | 58068Br1 | PECDD        | 0.34      |             |           | 5           | pg/g  |
| RS-04    | N          | 58068Br1 | HXCDF123478  | U         |             |           | 5           | pg/g  |
| RS-04    | N          | 58068Br1 | HXCDF123678  | U         |             |           | 5           | pg/g  |
| RS-04    | N          | 58068Br1 | HXCDF234678  | U         |             |           | 5           | pg/g  |
| RS-04    | N          | 58068Br1 | HXCDF123789  | U         |             |           | 5           | pg/g  |

| SampleId | SampleType | LabLotId | Parameter    | LabResult | LabQualifie | MethodDet | PracticalQ |
|----------|------------|----------|--------------|-----------|-------------|-----------|------------|
| RS-04    | N          | 58068B   | TCDF2378     | U         |             | 0.51      | 1          |
| RS-04    | N          | 58068B   | TCDF         | U         |             | 0.51      | 1          |
| RS-04    | N          | 58068B   | TCDD2378     | U         |             | 0.7       | 1          |
| RS-04    | N          | 58068B   | TCDD         | U         |             | 0.7       | 1          |
| RS-04    | N          | 58068B   | TCDD2378CL37 | 10.5      |             |           |            |
| RS-04    | N          | 58068B   | PECDF12378   | U         |             | 0.95      | 5          |
| RS-04    | N          | 58068B   | PECDF23478   | U         |             | 1         | 5          |
| RS-04    | N          | 58068B   | PECDF        | U         |             | 0.95      | 5          |
| RS-04    | N          | 58068B   | PECDD12378   | U         |             | 0.49      | 5          |
| RS-04    | N          | 58068B   | PECDD        | U         |             | 0.49      | 5          |
| RS-04    | N          | 58068B   | HXCDF123478  | U         |             | 0.75      | 5          |
| RS-04    | N          | 58068B   | HXCDF123678  | U         |             | 1         | 5          |
| RS-04    | N          | 58068B   | HXCDF234678  | U         |             | 2.9       | 5          |
| RS-04    | N          | 58068B   | HXCDF123789  | U         |             | 0.39      | 5          |
| RS-04    | N          | 58068B   | HXCDF        | U         |             | 0.39      | 5          |
| RS-04    | N          | 58068B   | HXCDD123478  | U         |             | 0.94      | 5          |
| RS-04    | N          | 58068B   | HXCDD123678  | U         |             | 1.5       | 5          |
| RS-04    | N          | 58068B   | HXCDD123789  | U         |             | 1.4       | 5          |
| RS-04    | N          | 58068B   | HXCDD        | U         |             | 0.94      | 5          |
| RS-04    | N          | 58068B   | HPCDF1234678 | U         |             | 2         | 5          |
| RS-04    | N          | 58068B   | HPCDF1234789 | U         |             | 1.7       | 5          |
| RS-04    | N          | 58068B   | HPCDF        | 0.48      |             | 1.7       | 5          |
| RS-04    | N          | 58068B   | HPCDD1234678 | 1.8 J     |             | 1.1       | 5          |
| RS-04    | N          | 58068B   | HPCDD        | 3.4 M     |             | 1.1       | 5          |
| RS-04    | N          | 58068B   | OCDF         | U         |             | 4.3       | 10         |
| RS-04    | N          | 58068B   | OCDD         | 12.1 B    |             | 2.6       | 10         |

**TAYLOR LUMBER**  
**Sheridan, OR**

**May 2002 GW**  
**Sampling Event**

**VALIDATED DATA**

**CONV, PAH-SIM,**  
**Pentachlorophenol,**  
**Inorganics, SVOCs,**  
**Project Notes**



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 10 LABORATORY  
7411 Beach Dr. East  
Port Orchard, Washington 98366

MEMORANDUM

DATE: June 26, 2002

TO: Loren McPhillips, Project Manager

FROM: M.K.Parker, Manchester Laboratory Chemist *MK Parker*

SUBJECT: Classical Chemistry Analyses for Taylor Lumber Project  
(TEC-440I) : Fluoride, Chloride, Sulfate and Total Dissolved Solids for  
Samples 02214004, 02214005, 02214007, 02214011, 02214013,  
02214018, 02214019.

The following is a quality assurance data review of classical chemistry analyses performed at the Manchester Laboratory. The analyses were performed following USEPA and laboratory guidelines at the USEPA Manchester Environmental Laboratory (MEL), Port Orchard, WA.

This is an exception memo. All Manchester Environmental Laboratory quality assurance criteria for the analyses were met (holding time, calibration correlation coefficient, method blank, initial and continuing calibration verification, independent calibration verification, sample duplication and matrix spike duplication) without exception.

All instrument results below the method detection limit for each analysis are qualified (U) to indicate to the data user that if the analyte is present in the samples, the concentration is below the minimum level at which the laboratory has established the practical quantitation limit.

Questions concerning the data may be directed to Kathy Parker at the Manchester Environmental Laboratory by either email ([parker.katherine@epa.gov](mailto:parker.katherine@epa.gov)) or telephone (360.871.8716).



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 10 LABORATORY  
7411 Beach Dr. East  
Port Orchard, Washington 98366

July 10, 2002

MEMORANDUM

SUBJECT: Peer Review and Data Validation Report of Low Level  
Polynuclear Aromatic Hydrocarbon Results for the Taylor  
Lumber Project Samples 02214000 to 02214023

FROM: *GH*  
Gerald H. Dodo, Chemist  
USEPA

TO: Loren McPhillips  
USEPA

CC: Scott Echols  
CH2M Hill

The following is a peer review and data validation report of the low level polynuclear aromatic hydrocarbon (PAH) analyses' results for water samples collected for the Taylor Lumber project. The samples were analyzed at the USEPA Region 10 Laboratory using USEPA SW846 Method 8270C in the selected ion mode. This report covers the samples listed above.

The project code for these samples is TEC-440I and the account number is 02T10P50102D10F1LA00.

Data qualifications

The following comments refer to the laboratory performance in meeting the Quality Control specifications outlined in the USEPA Method 8270C and the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99).

I. Holding Times: Acceptable

The samples were extracted within seven days from the time of collection. The extracts were analyzed within 40 days from the time of preparation. No qualifiers were applied based on holding times.



## II. GC/MS Tuning and Performance: Acceptable

The tuning summary agreed with the raw data. All decafluorotriphenylphosphine ion abundance met criteria. All sample analyses were preceded by a tune less than 12 hours prior to analysis. No qualifiers were applied on the basis of the tuning data.

## III. Initial Calibration: Acceptable

A seven-point initial calibration was performed on 06/17/02. Average RRFs met the criteria of  $\geq 0.05$ . Correlation coefficients were  $\geq 0.99$ . %RSDs of the RRFs met the criteria of  $\leq 30\%$ . No qualifiers were applied based on the initial calibration.

## IV. Continuing Calibration: Acceptable

The continuing calibration check standard met the criteria for frequency of analysis and RRT windows for all target compounds and surrogates. The RRFs were  $\geq 0.05$  and the accuracy for the target compounds met the criteria of 75-125% except for the following.

06/28/02 Diluted Reanalyses for Samples 02214010, 02214014, 02214017, 02214021, and 02214022.

Benzo(a)anthracene resulted with  $>125\%$  of the true value. The associated results for this compound were either non-detected or previously qualified J due to detection below the quantitation limit. Therefore, no qualifiers were applied based on this continuing calibration check.

07/02/02 Diluted Reanalyses for Samples 02214003 and 02214010.

Acenaphthylene resulted with  $>125\%$  of the true value. The associated results for this compound were previously qualified J due to detection below the quantitation limit, therefore, no qualifiers were applied based on this continuing calibration check.

## V. Blanks:

Method blanks were prepared and analyzed with the sample extraction batches. Target compounds detected in the samples were reported without qualification if the sample result area integration exceeded five times that of the blank. Detected sample results were qualified U if the area integration was below this criterion. The sample concentration or the sample

quantitation limit, whichever is greater, was reported as the qualified result.

VI. Surrogates: Acceptable

Method 8270C and the Functional Guidelines specifications for surrogate recoveries were applied. A criterion of 50-150% recovery for pyrene-d10 was applied as well. The surrogate recoveries met the criteria. No qualifiers were applied based on the surrogates.

VII. Matrix Spike/Matrix Spike Duplicate (MS/MSD): Acceptable

An MS/MSD analysis was performed using sample 02214004 (S1/S2). The Region 10 acceptance ranges (50-150% recovery,  $\leq 50\%$  relative percent difference, RPD) were applied. The recoveries met the criteria, therefore, no qualifiers were applied based on the MS/MSD.

VIII. Fortified Blank: Acceptable

A fortified blank analysis (OBF2149A1) was performed with this set of samples. The Region 10 acceptance range of 50-150% recovery was applied. The recoveries met the criterion, therefore, no qualifiers were applied based on the fortified blank.

IX. Internal Standard Performance: Acceptable

The retention time variations of all internal standards were within 30 seconds of the continuing calibration standard. The %areas of all internal standards were within the specified 50% to 200% of the continuing calibration standard. No qualifiers were applied based on the internal standards.

X. Target Compound Identification: Acceptable

All detected target compounds' relative retention times were within acceptable limits of the related standards in the continuing calibration standard. Criteria were met for mass spectral ion matching and ion abundance matching or the mass spectra were judged acceptable.

XI. Compound Quantitation:

Calculations were based on the initial calibration. Sample quantitation limits were adjusted appropriately as according to

sample amounts and calibration data. Detected results below the sample quantitation limits were qualified J.

XII. Tentatively Identified Compounds: Acceptable

Spectra for all tentatively identified compounds (TICs) met criteria for mass spectral ion matching and ion abundance matching or the mass spectra were judged acceptable.

Overall Assessment for the Case

The usefulness of the data is based on the criteria outlined in the USEPA Method 8270C and the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99). All requirements for data qualifiers from the preceding sections were accumulated. Each sample data summary sheet and each compound was checked for positive or negative results. From this overall need for data qualifiers for each analysis was determined. In cases where more than one of the preceding sections required data qualifiers, the most restrictive qualifier has been added to the data.

In general, all unqualified data can be used without restriction. The usefulness of qualified data should be treated according to the severity of the qualifier. Should questions arise regarding the qualification of data and its relation to the usefulness, the reader is encouraged to contact Gerald Dodo at the Region 10 laboratory, phone number (360) 871-8728.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 10 LABORATORY  
7411 Beach Dr. East  
Port Orchard, Washington 98366

## LABORATORY QUALIFIER/REMARK CODE DEFINITIONS

| Qualifier/<br>Remark Code | Definition<br>(Codes Assigned To Values)   |
|---------------------------|--|
| <                         | Microbiology – Level of target organism present in the sample is less than detection limit. The reported value is the detection limit.<br><br>Flash Point – The expected flash point temperature is less than the reported value.  |
| >                         | Microbiology – Level of target organism exceeds upper limit for acceptable range of countable colonies (MF only) or exceeds MPN indices based on number of positive tubes (MPN only). The reported value is the upper limit.<br><br>Flash Point – If the sample has a flashpoint, it is greater than the reported value. |
| J                         | The identification of the analyte is acceptable; the reported value is an estimate.  |
| JK                        | The identification of the analyte is acceptable; the reported value is an estimate and may be <u>biased high</u> . The actual value is expected to be less than the reported value.  |
| JL                        | The identification of the analyte is acceptable; the reported value is an estimate and may be <u>biased low</u> . The actual value is expected to be greater than the reported value.  |
| K                         | The identification of the analyte is acceptable; the reported value may be <u>biased high</u> . The actual value is expected to be less than the reported value.   |
| L                         | The identification of the analyte is acceptable; the reported value may be <u>biased low</u> . The actual value is expected to be greater than the reported value.   |
| N                         | There is presumptive evidence that the analyte is present; the analyte is reported as a tentative identification.  |
| NJ                        | There is presumptive evidence that the analyte is present; the analyte is reported as a tentative identification. The reported value is an estimate.   |
| U                         | The analyte was not detected at or above the reported value.   |
| UJ                        | The analyte was not detected at or above the reported value. The reported value is an estimate.  |

| Qualifier/<br>Remark Code | Definition<br>(Codes With No Reported Values)   |
|---------------------------|---|
| A                         | Absent – The target parameter was analyzed for but was not present or was undetected. <u>No value is reported with this qualification.</u>  |
| NA                        | Not Applicable, the parameter was not analyzed for, or there is no analytical result for this parameter. <u>No value is reported with this qualification.</u>                         |
| P                         | Present at a undetermined level – The target parameter is present but not quantifiable or no quantifiable result was determined. <u>No value is reported with this qualification.</u> |

| Remark Code | Definition<br>(Codes With No Reported Values)   |
|-------------|---|
| R           | The presence or absence of the analyte can not be determined from the data due to severe quality control problems. The data are rejected and considered unusable. <u>No value is reported with this qualification.</u>                    |
| T           | A trace of the subject parameter was present. For asbestos analysis the subject parameter was identified but at a low level that a quantifiable percentage of content is unreliable. <u>No value is reported with this qualification.</u> |

| Qualifier/<br>Remark Code | Definition<br>(Codes Assigned To Values Generated via Field or Screening Methods)  |
|---------------------------|--|
| F                         | The associated datum was generated using field methods and/or screening methods. The identification of the analyte is acceptable and the reported value has been found to be acceptable for use.   |
| JF                        | The associated datum was generated using field methods and/or screening methods. The identification of the analyte is acceptable and the reported value is an estimate.  |
| JKF                       | The associated datum was generated using field methods and/or screening methods. The identification of the analyte is acceptable; the reported value is an estimate and may be <u>biased high</u> . The actual value is expected to be less than the reported value.   |
| JLF                       | The associated datum was generated using field methods and/or screening methods. The identification of the analyte is acceptable; the reported value is an estimate and may be <u>biased low</u> . The actual value is expected to be greater than the reported value. |
| UF                        | The associated datum was generated using field methods and/or screening methods. The analyte was not detected at or above the reported value.  |
| UJF                       | The associated datum was generated using field methods and/or screening methods. The analyte was not detected at or above the reported value. The reported value is an estimate.   |

| Qualifier/<br>Remark Code | Cross Reference to Older Codes                    |
|---------------------------|---|
| A                         | UND, ND – Undetected, Not detected                |
| NA                        | NAR, NAF – No analytical result, Not analyzed for |
| P                         | PNQ – Present but not quantified                  |
| R                         | REJ - Rejected                                    |
| T                         | TRACE   |

**NOTE:** For any qualifier code see the QA memo or case narrative for a more detailed description of its use.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 10 LABORATORY  
7411 Beach Dr. East  
Port Orchard, Washington 98366

June 14, 2002

MEMORANDUM

SUBJECT: Case Narrative for the Pentachlorophenol Results for Taylor Lumber Samples  
02214000 - 02214024

FROM: Randy Cummings, Chemist  
USEPA

A handwritten signature in black ink, appearing to read "Randy Cummings".

REVIEWED BY: Steven Reimer, Chemist  
USEPA

A handwritten signature in black ink, appearing to read "Steven Reimer".

TO: Loren McPhillips, Project Officer  
USEPA

The following is a case narrative of the Pentachlorophenol (PCP) analytical results for water samples collected for the Taylor Lumber and Treating Groundwater Monitoring project. The samples were extracted and analyzed by the USEPA Region 10 Laboratory located at Manchester, Washington. USEPA Method 515.3 (SOP OR\_C515A) was used for the extraction and analysis. The method was modified from the SOP in the following manner: 1) 40mL Volatile Organic Analysis (VOA) vials were used instead of the 60mL vials suggested, 2) 30mL sample size was used instead of the 40mL suggested (because of the sample container size), 3) 3mL of MTBE was used for the extraction instead of the 4mL suggested (to compensate for the sample volume difference), 4) the hydrolysis step was skipped (because ethers of PCP are not susceptible to hydrolysis), and 5) standards and surrogates were prepared in a manner proportional with the samples.

An initial demonstration of capability study (IDC) was previously performed to ensure the modifications did not compromise data quality. The IDC data was archived with Baxter (January 2002, project code ESD-069A and account number 0203B10P90102E).

This report covers the samples listed above. The project code for these samples is TEC-440I and the account number is 02T10P50102D10F1LA00.

Data qualifications

The following comments refer to the laboratory performance in meeting the Quality Control specifications outlined in USEPA SW 846 and/or the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99).

I. Holding Times: Acceptable

The water samples for herbicide analysis were extracted within 7 days of collection. The samples in the first extraction batch (extracted on May 24<sup>th</sup>) were analyzed at 17 days from the extraction. Method 515.3 allows a 14 day holding period for analysis, but has a 14 day holding period for extraction. Other EPA methods allow up to 40 days holding period for extract analysis (SW-846 8151). It is not expected that the three day delay compromised data quality as long as all other quality assurance parameters were met. Therefore no qualifiers were assigned for this reason.

II. Initial Calibration: Acceptable

Initial calibrations were performed using a Model 6890 Agilent plus series gas chromatograph (GC-Thor). DB-35MS and DB-XLB 30m X 0.25 mm internal diameter columns were used. The columns were coupled to a pressure temperature- vaporization inlet system (PTV) and to dual micro electron capture detectors ( $\mu$ ECDs).

Thirty microliter injections were used. The procedural standard preparation technique was employed to construct five to six calibration levels using an internal standard calibration curve. Calibration was performed on 06/10/02.

Linear least squares fit or average fit functions were applied with correlation coefficients of  $\geq 0.99$  or  $RSD \leq 20\%$ . Each calibration level was requantified with the result fit against expected values. A  $\leq 20\%$  relative percent difference (RPD) criterion was applied to each calibration level.

III. System Performance Check: Acceptable

Peak symmetry for 4-Nitrophenol was within specifications.

IV. Calibration Checks: Acceptable

The calibration checks met the criteria for frequency of analysis and retention time (RT) windows. The percent difference (%D) amount criterion of  $\leq 30\%$  from the expected values was met for each analytical sequence. Internal standard peak height count deviations for the calibration checks were  $\leq 30\%$  of the calibration average.

A second source standard (HERB0326MX, 6.0 $\mu$ L per sample) was run as a fortified blank (OBF2148A1) to confirm the integrity of the calibration. The spiked PCP concentration was 9.50 $\mu$ g/L. Deviation from the expected concentration was within specifications ( $\leq 30\%$  deviation).

V. Method Blanks: Acceptable

A set of method blanks was prepared and analyzed with each sample extraction batch. No target compounds were determined above the reporting level.

VI. Surrogates Recovery: Acceptable

2,4-Dichlorophenylacetic acid (DCAA) was added to each sample as a surrogate. Recoveries were generally calculated from the average result of the two gas chromatographic

columns used. Several samples had interference from a tetrachlorophenol compound on one of the two columns used (Channel "B"). In those cases, only the results from one column were reported.

Dilutions were calculated from the atomic emission detector analysis and only the diluted extracts were analyzed by GC-ECD. Therefore, the surrogate recoveries from the ECD analysis were not calculated or reported for samples requiring dilution. In those cases no surrogate recovery was reported. Affected samples include 02214009, 02214010, 02214014, 02214015, 02214016, 02214017, 02214020, 02214021, 02214022 and 02214024.

The retention times for DCAA in samples 02214002 and 02214003 shifted enough where a smaller interfering peak was incorrectly identified as DCAA. Removal of that peak's integration allowed proper identification and quantification of DCAA.

The average recovery for DCAA in samples, blanks and spiked samples, where the recovery could be determined, was 97.3% with a relative standard deviation (RSD) of 6.8%. These recovery and precision data were within the range of expectation. No qualifiers were applied based on surrogate recoveries.

VII. Fortified Blank Samples: Acceptable

The method used employs procedural standards. Procedural standards are prepared identically to fortified blanks. Therefore batch calibration check standards can also be used as fortified blanks.

Calibration check standards were extracted with each extraction batch after the initial batch (05/29/02 & 05/30/02). These standards were reported as a fortified blank samples for purposes of elucidation. Recoveries met the 70 - 130% recovery criteria for PCP.

VIII. Matrix Spike Samples: Acceptable

A set of matrix spiked samples was prepared from sample 02214004. The spiking level for PCP was 0.400µg/L. PCP recoveries were within the range of expectation (70 - 130% recovery), and had a relative standard deviation within 30%.

VIII. Target Compound Identification: Acceptable

Detected target compounds were based on retention time comparisons against calibration standards.

IX. Sample Analysis: Acceptable

The samples were screened prior to the ECD analysis using a gas chromatograph with a PTV inlet and VICI VB-5 30m X 0.25mm ID X 0.25 µm df interfaced to an HP-2350 atomic emission detector (GC-AED, Horus). The screen generally followed SW-846 Method 8085 protocol using Compound Independent Calibration (CIC) combined with a two level analyte calibration. PCP was estimated from the analyte calibration although CIC criteria for that compound was also met. DCAA was estimated from the CIC chlorine response factor. Recoveries for all samples were determined, and the result ranged from 74 to 139% with an average of 109% and a standard deviation of 11% . The recoveries for DCAA at the extremes were biased as a result of interference from tetrachlorophenols. Since these recoveries were estimates, they were not reported with the data results.



Internal standard peak height count deviations for the samples were  $\leq 30\%$  of the calibration average for all reported data.

The calibration was performed to output data directly in  $\mu\text{g/L}$  given a 30mL sample size extracted with 3mL of solvent. The spreadsheet used to perform the output calculations is designed for data output of nanograms per microliter. Therefore a correction factor was used in the **dilution factor range** to allow for the  $\mu\text{g/L}$  output and varying sample volumes from that of the standards'. The correction factor is  $0.0300\text{L}/3.00\text{ml} = 0.01\text{L/mL}$ .

X. Overall Assessment for the Case

The usefulness of the data is based on the criteria outlined in USEPA SW 846 and/or the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, 10/99. All requirements for data qualifiers from the preceding sections were accumulated. Each sample data summary sheet and each compound was checked for positive or negative results. From this, the overall need for data qualifiers for each analysis was determined. In cases where more than one of the preceding sections required data qualifiers, the most restrictive qualifier has been added to the data.

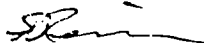
In general, all unqualified data can be used without restriction. The usefulness of qualified data should be treated according to the severity of the qualifier. Should questions arise regarding the qualification of data and its relation to the usefulness, the reader is encouraged to contact Randy Cummings at the Region 10 laboratory, phone number (360) 871-8707.



17 June 2002

**MEMORANDUM**

**SUBJECT:** Peer Review, Validation Memo Quality Assurance Narrative for Taylor Lumber Water Samples For Pentachlorophenol.

**FROM:** Steve Reimer   
Chemist

**TO:** Loren McPhillips  
Project Officer

Validation Memo Quality Assurance for water samples from Taylor Lumber for pentachlorophenol. Extraction and analysis of the samples was performed by EPA Method 515.3. The samples included in this memo are #'s 0221400 - 02214024.

Project Code: TEC-440I Account Code: 02T10P50102D10F1LA00

Holding Times: Acceptable.

The samples were collected 20 through 23 May 2002. The samples were extracted on 24, 28 and 29 May 2002. The sample extracts and other associated extracts were screened on 30 May 2002 and analyzed 10 June 2002.

Instrument Performance: Acceptable.

An Agilent 6890 gas chromatograph (GC) using dual micro electron capture (EC) detectors with DB-35MS and DB-XLB narrow-bore capillary columns (0.25mm ID x 30m) was used for this analysis.

Retention Time Windows: Acceptable.  
Retention times for the standards were within the windows set by the initial calibration.

Surrogate Retention Times: Acceptable.  
Where detected, all surrogates appeared within their respective windows in all samples.

Calibration:

Initial Calibration: Acceptable.

Procedural standards were used with thirty microliter injections and an internal standard to construct six point curves. Correlation coefficients were greater than 0.99 or RSD  $\leq$  20%.

System Performance: Acceptable.

Peak symmetry for 4-nitrophenol was within normal parameters.

Analytical Sequence: Acceptable.

Continuing Calibration: Acceptable.

The continuing calibration standards were within the 30% difference criterion for both columns. Internal standard peak heights were within the 30% criterion.

Method Blank Analysis: Acceptable:

Method blanks; OBW2144D1, OBW2148D1 and OBW2149D1, were analyzed with the water samples. No peaks occurred at or above the quantitation limit in any of the blanks.

Surrogate Recovery: Acceptable

2,4-Dichlorophenylacetic acid (DCAA) was added as a surrogate to each of the herbicides. All samples were screened using an GC-AED by EPA Method 8085. Those samples with detectable PCP were diluted to the appropriate final volume for analysis by GC-ECD. For ten of the samples the dilution required prevented the detection of the surrogate. Recovery averaged 98% where the recovery could be determined. The relative standard deviation was 7%. These were within the range expected.

Matrix Spike/Matrix Spike Duplicate: Acceptable

A pair of matrix spiked samples was prepared from sample 02144004. The spike level was 0.400  $\mu\text{g/L}$ . The recoveries were within the expected range of 70 to 130% with a RSD less than 30%.

Fortified Blank Samples: Acceptable

A fortified blank was prepared along with each batch of samples. These were also used as the calibration check standard. The recoveries were within the expected range (70% to 130%).

Compound Identification/Quantitation:

Nineteen of the samples contained detectable levels of pentachlorophenol, seventeen of those were above the quantitation limit of 0.50 µg/L. The highest levels were found in samples 02144021, 02144022 and 02144024 with levels of 530 µg/L, 590 µg/L and 2300 µg/L.

Overall Assessment/Data Use:

Acceptable for use with no qualifiers assigned. The data was evaluated using the guidelines set out in the "Laboratory Data Validation Functional Guidelines for Evaluating Organic Analyses" (Dec. '94).



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 10  
1200 Sixth Avenue  
Seattle, WA 98101

July 2, 2002

Reply To  
Attn Of: OEA-095

**MEMORANDUM**

SUBJECT: Data Validation Report for the Inorganic Analysis of Samples from the Taylor Lumber and Treating Co. site. Case: 30526 SDG: MJ0PC3

FROM: Chris Pace, QA Chemist, OEA

TO: Loren McPhillips, RPM, ECL

CC: Bruce Woods, CLP PO, OEA  
Scott Echols, CH2M HILL

The quality assurance review of nineteen water samples collected from the above referenced site has been completed. These samples were analyzed for total metals by Chemtech of Englewood, NJ. The following samples were reviewed in this validation report:

|        |        |        |        |
|--------|--------|--------|--------|
| MJ0PC3 | MJ0PC8 | MJ0PCE | MJ0PCK |
| MJ0PC4 | MJ0PC9 | MJ0PCF | MJ0PCL |
| MJ0PC5 | MJ0PCA | MJ0PCG | MJ0PCM |
| MJ0PC6 | MJ0PCB | MJ0PCH | MJ0PCN |
| MJ0PC7 | MJ0PCD | MJ0PCJ |        |

**DATA QUALIFICATIONS**

The following comments refer to the laboratory performance in meeting the Quality Control Specifications outlined in the Contract Laboratory Program (CLP) Statement of Work (SOW) for Inorganic Analysis (ILM04.1) and the USEPA CLP Functional Guidelines for Inorganic Data Review, 2/94.

The conclusions presented herein are based on the information provided for the review.

### **Holding Time - Acceptable**

The holding time for mercury is 28 days from the date of sample collection to analysis and 180 days for the rest of the metals. The samples were collected on 5/20, 5/21, 5/22 and 5/23/02. The samples were analyzed for mercury within 25 days and all other metals within 21 days of the sample collection date.

### **Sample Preparation - Acceptable**

The samples were prepared in accordance with the methods used.

### **Initial Calibration - Acceptable**

All of the samples were analyzed for total mercury using Cold Vapor Atomic Absorption Spectroscopy (CVAAS). The initial calibration for mercury met the frequency of analysis and the linearity criteria (correlation coefficients,  $r \geq 0.995$ ).

The rest of the target analytes were analyzed using Inductively Coupled Plasma-Atomic Emission Spectroscopy (ICP-AES). The initial calibration for ICP-AES met the frequency of analysis and the linearity criteria (correlation coefficients,  $r \geq 0.995$ ).

### **Calibration Verification - Acceptable**

The initial and continuing calibration verifications met the criteria for frequency of analysis and recovery criteria of 90-110% and 80-120% for mercury. The recoveries ranged from 93-109% for ICP-AES and from 95-108% for mercury.

### **Detection Limits - Acceptable**

All of the target analytes met the project required quantitation limits. All of the Contract Required Detection Limit (CRDL) checks met the frequency of analysis and recovery criteria. All of the reported results were adjusted for sample amounts analyzed.

Target analytes that were detected at concentrations less than the CRDL and greater than the IDL were qualified as estimated, "J". The "B" qualifiers applied by the laboratory were crossed out by the reviewer.

### **Blanks**

Procedural blanks were prepared with the samples to indicate potential contamination from the digestion or analytical procedure. If an analyte was found in the associated blank, the sample results were qualified as non-detects, "U", if the analyte concentration is less than five times the analytical value in the blank.

The frequency of analysis of blanks was met. Based on the target analytes detected in the procedural, initial and continuing calibration blanks, the following results were qualified as non-detects, "U":

| Analyte  | Associated Samples   |
|----------|--|
| aluminum | MJ0PC3, MJ0PC6, MJ0PCB, MJ0PCG, MJ0PCK   |
| cobalt   | MJ0PC4, MJ0PC5, MJ0PC6   |
| nickel   | MJ0PC9, MJ0PCD, MJ0PCK, MJ0PCN   |
| vanadium | MJ0PC3, MJ0PC4, MJ0PC5, MJ0PCB, MJ0PCE, MJ0PCG, MJ0PCH, MJ0PCK, MJ0PCM, MJ0PCN |

Analytes which yielded a negative response in the preparation blank and/or continuing calibration blank(s) at concentrations comparable to or less than the absolute value of the blank(s) were qualified as estimated, "J/UJ". The following samples were qualified:

| Analyte   | Associated Samples   |
|-----------|--|
| aluminum  | MJ0PC4, MJ0PC5, MJ0PC7, MJ0PC8, MJ0PC9, MJ0PCA, MJ0PCB, MJ0PCD, MJ0PCE, MJ0PCF, MJ0PCG, MJ0PCH, MJ0PCJ, MJ0PCK, MJ0PCL, MJ0PCN |
| cadmium   | All  |
| copper    | MJ0PC6, MJ0PC7, MJ0PC8, MJ0PC9, MJ0PCA, MJ0PCB, MJ0PCD, MJ0PCE   |
| potassium | MJ0PCM, MJ0PCN   |
| zinc      | MJ0PC3, MJ0PC4, MJ0PC5, MJ0PC6, MJ0PCD, MJ0PCE   |

#### ICP-AES Interference Check Sample - Acceptable

The ICP-AES interference check samples (ICS) were analyzed to verify inter-element and background correction factors. The frequency of analysis (beginning and end of sequence) and recovery criteria (80-120%) were met. The recoveries ranged from 87-115%.

#### ICP-AES Serial Dilution Analysis - Acceptable

Sample MJ0PC5 was analyzed for serial dilution. All of the analytes which exceeded the minimum concentration criterion (50 times the IDL) agreed within 10% difference.

#### Laboratory Control Sample - Acceptable

The frequency of analysis and the recovery criteria (80-120%) for the laboratory control sample were met. The recoveries ranged from 88-109%.

### **Duplicate Sample Analysis - Acceptable**

Sample MJ0PC5 was utilized for duplicate analysis. The duplicate results met the frequency of analysis and control limit criteria ( $\pm 20\%$  or  $\pm \text{CRDL}$ ) for all target analytes.

### **Matrix Spike Analysis - Acceptable**

Sample MJ0PC5 was used for the spike analysis. The frequency of analysis and recovery criteria (75-125%) were met. All spike recoveries were acceptable and ranged from 78-113%.

### **Laboratory Contact**

The laboratory was not contacted for this review.

### **Overall Assessment**

The total number of data points was 437. One hundred thirty four (31%) were qualified as estimated due to concentrations below the CRDL and negative blanks. Nineteen (4.3%) were qualified as non-detected due to blank contamination.

All of the samples were analyzed in accordance with technical specifications outlined in the SOW. The data, as qualified, are acceptable and can be used for all purposes.

### **DATA QUALIFIERS**

Combine the qualifiers found in the C and Q columns to obtain the complete qualification of each individual analyte.

- U - The analyte was not detected at or above the reported result.
- J - The analyte was positively identified. The associated numerical result is an estimate.
- R - The data are unusable for all purposes.
- UJ - The analyte was not detected at or above the reported estimated result. The associated numerical value is an estimate of the quantitation limit of the analyte in this sample.





**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**REGION 10**  
1200 Sixth Avenue  
Seattle, WA 98101

July 1, 2002

Reply To  
Attn Of: OEA-095

**MEMORANDUM**

**SUBJECT:** Data Validation Report for the Inorganic Analysis of Samples from the Taylor Lumber and Treating Co. site. Case: 30526 SDG: MJ0PCC

**FROM:** Chris Pace, QA Chemist, OEA CP

**TO:** Loren McPhillips, RPM, ECL

**CC:** Bruce Woods, CLP PO, OEA  
Scott Echols, CH2M HILL

The quality assurance review of seven water samples collected from the above referenced site has been completed. These samples were analyzed for total metals by Chemtech of Englewood, NJ. The following samples were reviewed in this validation report:

|        |        |
|--------|--------|
| MJ0PCC | MJ0PCS |
| MJ0PCP | MJ0PCT |
| MJ0PCQ | MJ0PCW |
| MJ0PCR |        |

**DATA QUALIFICATIONS**

The following comments refer to the laboratory performance in meeting the Quality Control Specifications outlined in the Contract Laboratory Program (CLP) Statement of Work (SOW) for Inorganic Analysis (ILM04.1) and the USEPA CLP Functional Guidelines for Inorganic Data Review, 2/94.

The conclusions presented herein are based on the information provided for the review.

### **Holding Time - Acceptable**

The holding time for mercury is 28 days from the date of sample collection to analysis and 180 days for the rest of the metals. The samples were collected on 5/21, 5/22 and 5/23/02. The samples were analyzed for mercury within 24 days and all other metals within 20 days of the sample collection date.

### **Sample Preparation - Acceptable**

The samples were prepared in accordance with the methods used.

### **Initial Calibration - Acceptable**

All of the samples were analyzed for total mercury using Cold Vapor Atomic Absorption Spectroscopy (CVAAS). The initial calibration for mercury met the frequency of analysis and the linearity criteria (correlation coefficients,  $r \geq 0.995$ ).

The rest of the target analytes were analyzed using Inductively Coupled Plasma-Atomic Emission Spectroscopy (ICP-AES). The initial calibration for ICP-AES met the frequency of analysis and the linearity criteria (correlation coefficients,  $r \geq 0.995$ ).

### **Calibration Verification - Acceptable**

The initial and continuing calibration verifications met the criteria for frequency of analysis and recovery criteria of 90-110% and 80-120% for mercury. The recoveries ranged from 93-109% for ICP-AES and from 95-108% for mercury.

### **Detection Limits - Acceptable**

All of the target analytes met the project required quantitation limits. All of the Contract Required Detection Limit (CRDL) checks met the frequency of analysis and recovery criteria. All of the reported results were adjusted for sample amounts analyzed.

Target analytes that were detected at concentrations less than the CRDL and greater than the IDL were qualified as estimated, "J". The "B" qualifiers applied by the laboratory were crossed out by the reviewer.

### **Blanks**

Procedural blanks were prepared with the samples to indicate potential contamination from the digestion or analytical procedure. If an analyte was found in the associated blank, the sample results were qualified as non-detects, "U", if the analyte concentration is less than five times the analytical value in the blank.

The frequency of analysis of blanks was met. Based on the target analytes detected in the procedural, initial and continuing calibration blanks, the following results were qualified as non-detects, "U":

| Analyte  | Associated Samples     |
|----------|------------------------|
| vanadium | MJ0PCR, MJ0PCS, MJ0PCT |
| iron     | MJ0PCS                 |

Analytes which yielded a negative response in the preparation blank and/or continuing calibration blank(s) at concentrations comparable to or less than the absolute value of the blank(s) were qualified as estimated, "J/UJ". The following samples were qualified:

| Analyte | Associated Samples |
|---------|--------------------|
| cadmium | All                |
| zinc    | All except MJ0PCS  |

#### ICP-AES Interference Check Sample - Acceptable

The ICP-AES interference check samples (ICS) were analyzed to verify inter-element and background correction factors. The frequency of analysis (beginning and end of sequence) and recovery criteria (80-120%) were met. The recoveries ranged from 87-115%.

#### ICP-AES Serial Dilution Analysis - Acceptable

Sample MJ0PCC was analyzed for serial dilution. All of the analytes which exceeded the minimum concentration criterion (50 times the IDL) agreed within 10% difference with the exception of sodium. Sodium only slightly exceeded the 10% difference criteria and therefore, was not qualified on this basis. The "E" qualifiers applied by the laboratory were crossed-out by the reviewer.

#### Laboratory Control Sample - Acceptable

The frequency of analysis and the recovery criteria (80-120%) for the laboratory control sample were met. The recoveries ranged from 90-110%.

#### Duplicate Sample Analysis - Acceptable

Sample MJ0PCC was utilized for duplicate analysis. The duplicate results met the frequency of analysis and control limit criteria ( $\pm 20\%$  or  $\pm \text{CRDL}$ ) for all target analytes.

#### Matrix Spike Analysis - Acceptable

Sample MJ0PCC was used for the spike analysis. The frequency of analysis and recovery criteria (75-125%) were met. All spike recoveries were acceptable and ranged from 78-120%.

## **Laboratory Contact**

The laboratory was not contacted for this review.

## **Overall Assessment**

The total number of data points was 161. Forty (25%) were qualified as estimated due to concentrations below the CRDL and negative blanks. Four (2.5%) were qualified as non-detected due to blank contamination.

All of the samples were analyzed in accordance with technical specifications outlined in the SOW. The data, as qualified, are acceptable and can be used for all purposes.

## **DATA QUALIFIERS**

Combine the qualifiers found in the C and Q columns to obtain the complete qualification of each individual analyte.

- U - The analyte was not detected at or above the reported result.
- J - The analyte was positively identified. The associated numerical result is an estimate.
- R - The data are unusable for all purposes.
- UJ - The analyte was not detected at or above the reported estimated result. The associated numerical value is an estimate of the quantitation limit of the analyte in this sample.

**Taylor  
Lumber**

**Sheridan, OR**

**February  
2002**

**Sampling  
Event**

**Manchester  
Data**



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 10 LABORATORY  
7411 Beach Dr. East  
Port Orchard, Washington 98366

11 March 2002

**MEMORANDUM**

**SUBJECT:** Peer Review, Validation Memo Quality Assurance Narrative for Taylor Lumber Water Samples For Pentachlorophenol.

**FROM:** Steve Reimer  
Chemist

**TO:** Loren McPhillips  
Project Officer

Validation Memo Quality Assurance for water samples from Taylor Lumber for pentachlorophenol. Extraction and analysis of the samples was performed by EPA Method 515.3. The samples included in this memo are #'s 02074000, 02074001, 02074002, 02074003, 02074004, 02074005, 02074006, 02074008, 02074009, 02074010, 02074011, 02074012, 02074013, 02074014, 02074015, 02074016, 02074017, 02074018, 02074019, 02074020, 02074021, 02074022, 02074023, 02074024, 02074025, 02074026, 02074027.

Project Code: TEC-440H011C Account Code: 02T10P50102D10F1LA00

Holding Times: Acceptable.

The samples were collected 12 through 15 February 2002. The samples were extracted on 20 and 21 February 2002. The sample extracts and other associated extracts were analyzed 22 through 27 February 2002.

Instrument Performance: Acceptable.

An Hewlett-Packard gas chromatograph (GC) using dual micro electron capture (EC) detectors with Restek Rtx-CLPEST and Rtx-CLPEST2 narrow-bore capillary columns (0.25mm ID x 30m) was used for this analysis.

Retention Time Windows: Acceptable.

Retention times for the standards were within the windows set by the initial calibration. The retention time windows used were 1.0% of the initial retention time.

Surrogate Retention Times: Acceptable.

All surrogates appeared within their respective windows in all samples.

Calibration:

Initial Calibration: Acceptable.

Procedural standards were used with thirty microliter injections and an internal standard to construct six point curves. Correlation coefficients were greater than 0.99 or RSD  $\leq$  20%.

System Performance: Acceptable.

Peak symmetry for 4-nitrophenol was within normal parameters.

Analytical Sequence: Acceptable.

Continuing Calibration: Acceptable.

The continuing calibration standards were within the 30 % difference criteria for both columns. Internal standard peak heights were within the 30 % criteria.

Method Blank Analysis: Acceptable:

Method blanks; OBW2050D1, OBW2058D1, OBW2052D1 and OBW2052D2, were analyzed with the water samples. No peaks occurred at or above the quantitation limit in any of the blanks.

Surrogate Recovery: Acceptable

2,4-Dichlorophenylacetic acid (DCAA) was added as a surrogate to each of the herbicides. Recovery averaged 103 % where the recovery could be determined. The relative standard deviation was 7 %. These were within the range expected.

Matrix Spike/Matrix Spike Duplicate: Acceptable

A pair of matrix spiked samples was prepared from sample 02074022. The spike level was 0.533  $\mu\text{g/L}$ . The recoveries were within the expected range of 70 to 130 % with a RSD less than 30 %.

Fortified Blank Samples: Acceptable

A fortified blank, OBF2052A1, was prepared along with the samples. This sample was also used as the calibration check standard. The recoveries were within the expected range (70%

to 130%).

Compound Identification/Quantitation:

Seventeen of the samples contained detectable levels of pentachlorophenol, eleven of those were above the requested reporting limit of 0.56 µg/L. The highest were samples 02074023 and 02074024, (MW101) with levels of 1500 µg/L.

Overall Assessment/Data Use:

Acceptable for use with no qualifiers assigned. The data was evaluated using the guidelines set out in the "Laboratory Data Validation Functional Guidelines for Evaluating Organic Analyses" (Dec. '94).





UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 10 LABORATORY  
7411 Beach Dr. East  
Port Orchard, Washington 98366

MEMORANDUM

DATE: May 13, 2002

TO: Loren McPhillips, Project Manager, EPA Region 10

From: Katie Adams, Chemist, EPA Region 10 *Katie Adams*  
OEA, Manchester Environmental Laboratory

cc: Scott Echols, CH2MHill  
Trish Larson, CH2MHill

Subject: Review and Verification of the Taylor Lumber Project water sample data

Project Code: TEC-440H  
Account Code: 02T10P50102D10F1LA00

The following is a Review and Verification of metals results from 28 water samples from the Taylor Lumber Site. The analyses were performed by ESAT chemists at EPA's Manchester Environmental Laboratory in Port Orchard, WA.

Samples:

|          |          |          |          |          |          |
|----------|----------|----------|----------|----------|----------|
| 02074000 | 02074001 | 02074002 | 02074003 | 02074004 | 02074005 |
| 02074006 | 02074007 | 02074008 | 02074009 | 02074010 | 02074011 |
| 02074012 | 02074013 | 02074014 | 02074015 | 02074016 | 02074017 |
| 02074018 | 02074019 | 02074020 | 02074021 | 02074022 | 02074023 |
| 02074024 | 02074025 | 02074026 | 02074027 |          |          |

**Data Qualifications**

The following comments refer to the laboratory's performance in meeting quality control specifications outlined in the *CLP Statement of Work (CLP-SOW) for Inorganic Analysis, rev. ILMO4.1*, the *Quality Assurance Plan for the US EPA Region 10 Manchester Environmental Laboratory, Draft 2000* and the QAPP. The qualifications recommended herein are based on the information provided for the review.

**1.0 Timeliness - Acceptable**

The technical holding time from the date of collection for metals (excluding mercury) in water is 180 days (40 CFR part 136). Sample collection began on 02/12/02, and metals analyses were completed on 05/07/02. No data qualification was required based on holding time criteria.

**2.0 Sample Preparation - Acceptable**

Samples were prepared for metals analysis on 04/29/02 following EPA Method 200.2. No qualification of the data was required based on sample preparation.

### **3.0 Calibration / Calibration Verification - Acceptable**

#### **ICP-AES (Inductively Coupled Plasma - Atomic Emission Spectroscopy)**

Sample analysis was conducted on 04/30/02 and 05/01/02 for Ag, Al, Ba, Be, Ca, Co, Cr, Cu, Fe, K, Mg, Mn, Na, Ni, Sn, V, and Zn. The ICP-AES was calibrated using one blank and a single calibration standard for each required element. The calibrations were performed as required by the appropriate Method and SOPs and met acceptance criteria.

Calibration verification samples are required before and after sample analysis and after every ten samples during analysis. All ICP-AES calibration verification (initial and continuing) met the frequency and recovery acceptance criteria for each required element.

No qualification of the data was required based on ICP-AES calibration or calibration verification.

#### **ICP-MS (Inductively Coupled Plasma - Mass Spectrometry)**

Sample analysis was conducted on 05/03/02 and 05/07/02 for As, Cd, Pb, Sb, Se, Mn, and Tl. The ICP-MS was calibrated according to the analytical method with a blank and at least four standards. The calibration curves were linear and yielded correlation coefficients greater than 0.995.

All ICP/MS calibration verification (initial and continuing) met the frequency and recovery acceptance criteria for each required element.

No qualification of the data was required based on ICP-MS calibration or calibration verification.

### **4.0 Blanks**

Procedural blanks were prepared with the samples to assess potential contamination resulting from the sample preparation or digestion. If an analyte was detected in the associated procedural blank, the sample results were qualified if the analyte concentration in the unknown samples was less than a factor of ten times the analyte value detected in the procedural blank. Trace levels of sodium, calcium, and manganese were detected in the procedural blanks for this project. The sodium results for samples 02074025 and 02074026, and the manganese result for sample 02074002, were qualified (J) to indicate that the results are estimates due to possible contamination. No other qualification was required on this basis.

### **5.0 Reference Control Sample / Certified Reference Material - Acceptable**

Reference control samples are digested and analyzed with the samples to verify the efficacy of laboratory procedures. All results met the recovery acceptance criterion. No qualification of the data was required based on reference control sample performance.

### **6.0 Duplicate Analysis - Acceptable**

Duplicate analysis was performed on samples 02074000 and 02074022. All results above the practical quantitation limit (PQL) were within the  $\pm 20\%$  RPD acceptance criterion. All results below the PQL were within  $\pm$  PQL acceptance criterion. No qualification was required on this basis.

### **7.0 Matrix Spike/Matrix Spike Duplicate Analysis**

Matrix spike/matrix spike duplicate (MS/MSD) sample analyses are performed to provide information about the effect of the sample matrix on digestion and measurement methods. The laboratory requires that matrix spike recoveries for digested samples must be within the limits of 75-125%. Post spike and other undigested spike recoveries are required to be within 85 - 115% of the spike added to the sample.

If the spike amount added is less than one quarter of the sample concentration, the recovery is reported "NA" and the result is not qualified. The recoveries are also reported "NA" for calcium, magnesium, potassium, and sodium because spikes

for these elements are not required by the method. Also, if the spike recovery is above 125% or the post spike is above 115%, and the sample result is below the detection limit of the analyte, the result is not qualified.

A post spike recovery in the acceptance range is an indication of the analytical performance but does not represent analyte recovery from the digestion process.

MS/MSD analysis was performed on samples 02074000 and 02074022. All matrix spike recoveries met the specified acceptance limits for both ICP-AES and ICP-MS analysis, with the exception of selenium for sample 02074000, where the matrix spike recovery was slightly outside the limits at 127%. The selenium matrix spike duplicate recovery for this sample was acceptable at 119%. The selenium results associated with these spike results were not qualified, because only one of the spike recoveries was high, and because it was only slightly outside the acceptance range.

No data qualification was required.

#### **8.0 Serial Dilution Analysis - Acceptable**

Samples 02074000 and 02074022 were analyzed by serial dilution to identify potential matrix interferences in the ICP-AES and ICP-MS analyses. All analytes that exceeded the minimum concentration criterion (50 times the Reporting Limit (RL)) agreed within 10% difference. No qualification of the data was required on this basis.

#### **9.0 ICS Analysis - Acceptable**

An ICS standard was prepared and analyzed to verify ICP-AES interelement and background correction factors. Analyses are required at the beginning and end of each ICP-AES analytical sequence. The recovery acceptance criteria are 80%-120% recovery of the true value. Analyses of the ICS standard met these criteria; therefore no data qualification was required.

#### **10.0 Detection Limits - Acceptable**

Sample results that fall below the Reporting Limit are assigned the value of the Reporting Limit and qualified 'U'. Results above the RL but below the Practical Quantitation Limit (PQL) are reported to two significant figures; sample results above the PQL level are reported to three significant figures.

Several samples required dilution in order to meet MEL quality control criteria. The detection limits associated with these samples have been raised to reflect the dilution.

#### **11.0 Overall Assessment of the Data**

This quality control review of the data was based on the criteria outlined in the *National Functional Guidelines for Inorganic Data Review (02/94)*. Results below the Reporting Limit were qualified (U). Two low-level sodium results and one low-level manganese result were qualified (J) due to possible contamination. No other qualification was required based on this review.

Definitions of laboratory qualifiers are attached.

Below are the definitions for the qualifiers used in the Inorganic area when qualifying data from Inorganic analysis.

#### DATA QUALIFIERS

- U - The analyte was not detected at or above the reported value.
- J - The identification of the analyte is acceptable; the reported value is an estimate.-
- UJ - The analyte was not detected at or above the reported value. The reported value is an estimate.
- NA - Not Applicable, the parameter was not analyzed for, or there is no analytical result for this parameter. No value is reported with this qualification.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 10  
1200 Sixth Avenue  
Seattle, WA 98101


April 19, 2002

Reply To  
Attn Of: OEA-095

MEMORANDUM

SUBJECT: Data validation report for the semi volatile organic compound (SVOC) and Polycyclic Aromatic Hydrocarbon (PAH) Selected Ion Monitoring (SIM) analysis of samples from the Taylor Lumber and Treating Groundwater Monitoring Site.

Project Code: TEC-440H Account Code: 02T10P50102D10F1LA00

FROM: Chris Pace, Chemist, OEA 

TO: Loren McPhillips, RPM, OEC

CC: Scott Echols, CH2MHill

The quality assurance (QA) review of 28 water samples collected from the above referenced site has been completed. All samples were analyzed for SVOCs and 26 for PAHs-SIM utilizing modifications of USEPA SW-846 Method 8270C by the Manchester Environmental Laboratory in Manchester, WA.

The following sample numbers were validated in this report:

|           |          |          |           |
|-----------|----------|----------|-----------|
| 02074000  | 02074001 | 02074002 | 02074003  |
| 02074004  | 02074005 | 02074006 | 02074007  |
| 02074008  | 02074009 | 02074010 | 02074011  |
| 02074012  | 02074013 | 02074014 | 02074015  |
| 02074016  | 02074017 | 02074018 | 02074019  |
| 02074020  | 02074021 | 02074022 | 02074023* |
| 02074024* | 02074025 | 02074026 | 02074027  |

\* Analyzed for SVOCs only.

**DATA QUALIFICATIONS**

The following comments refer to the laboratory performance in meeting the Quality Control (QC) Specifications outlined in the USEPA SW-846, laboratory standard operating procedures, QAPP and/or the USEPA CLP National Functional Guidelines for Organic Data Review (10/99).

The conclusions presented herein are based on the information provided for the review.

### Holding Time - Acceptable

The samples were collected on 2/12, 2/13, 2/14 and 2/15/02. All of the samples met the technical (40 CFR 136) holding time criteria for all analyses.

### Instrument Performance Check - Acceptable

All of the GC/MS instrument performance checks met the ion abundance criteria. All of the samples were analyzed within an acceptable 12-hour QC period. The instruments used remained stable throughout the course of analyses.

### Initial Calibrations - Acceptable

One SVOC and one PAH-SIM initial calibration was performed. Target compounds and surrogates quantitated using average relative response factors (RRFs) all had percent relative standard deviations (%RSDs)  $\leq 20\%$ . Target compounds quantitated using linear calibrations all had correlation coefficients  $\geq 0.99$ .

### Continuing Calibration Verification (CCV)

All of the SVOC and PAH-SIM CCV checks met the criteria for frequency of analysis, minimum RRF of 0.05 and percent difference (%D) of  $\pm 25\%$  with the following exceptions:

- The %Ds for the following SVOC and PAH-SIM compounds exceeded the QC limits:

| Date/Time of Analysis | Analysis | Compound               | %D  | Qualifier Detect/Non-detect |
|-----------------------|----------|------------------------|-----|-----------------------------|
| 02/27/02 (1503)       | SVOC     | benzidine              | 33% | J/none                      |
| 02/28/02 (1319)       | SVOC     | benzidine              | 31% | J/none                      |
| 03/14/02 (1403)       | PAH-SIM  | benzo(a)anthracene     | 29% | J/none                      |
| 03/18/02 (1102)       | PAH-SIM  | indeno(1,2,3-cd)pyrene | 37% | J/none                      |

### Quantitation - Acceptable

The quantitation limits (QLs) were based on the lowest standard concentration analyzed in the initial calibrations. Target compounds that were detected at concentrations less than the QLs were qualified as estimated, "J". All of the reported results were adjusted for sample amounts analyzed.

## Blanks

Di-n-butylphthalate was detected below the QL in the SVOC blank OBW2049A2. Di-n-butylphthalate detected in the samples at concentrations less than ten times the value in their associated blank were qualified as non-detects, "U".

Naphthalene, 2-methylnaphthalene, 1-methylnaphthalene, dibenzofuran, flourene, phenanthrene and fluoranthene were detected below the QL in the PAH-SIM blanks OBW2050A1 and OBW2050A2. Naphthalene, 2-methylnaphthalene, 1-methylnaphthalene, dibenzofuran, flourene, phenanthrene, fluoranthene and pyrene were detected below the QL in the PAH-SIM blanks OBW2052A1 and OBW2052A2. PAHs detected in the samples at concentrations less than five times the value in their associated blank were qualified as non-detects, "U".

## Analytical Sequence - Acceptable

All of the standards, blanks, samples, and QC samples were analyzed in accordance with the method specified analytical sequence.

## Surrogate Compound Recovery - Acceptable

All of the SVOC surrogate compound recoveries met the applicable QC criteria with the following exceptions: 2-Fluorophenol and 2-chlorophenol in the undiluted analysis of sample 02074023 could not be determined accurately due to matrix interferences. Satisfactory results were reported for 2-fluorophenol and 2-chlorophenol in the 10X dilution analysis of sample 02074023. None of the data were qualified on this basis.

All of the PAH-SIM surrogate compound recoveries met the applicable QC criteria with the following exceptions: Terphenyl-d14 had a slightly high recovery in sample OBW2050A1. None of the data were qualified on this basis.

## Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Sample 02074022 was utilized for SVOC and PAH-SIM MS/MSD analyses.

Recoveries and relative percent differences (RPDs) for SVOC were acceptable with the following exceptions: 4-chloroaniline and caprolactam had low recoveries. The non-detected 4-chloroaniline and caprolactam results in sample 02074022 were qualified as estimated, "UJ". Hexachlorocyclopentadiene had a slightly low recovery in samples 02074022MS/MSD and was not qualified on this basis.

Recoveries and relative percent differences (RPDs) for PAH-SIM were acceptable with the following exceptions: naphthalene, 2-methylnaphthalene, 2-chloronaphthalene, acenaphthene, dibenzofuran, phenanthrene, benzo(k)fluoranthene, dibenzo(a,h)anthracene and benzo(g,h,i)perylene all had slightly low recoveries in samples 02074022MS/MSD. None of the data were qualified on this basis.

## Internal Standards

The acceptance criteria for internal standards (IS) are  $\pm 30$  seconds for retention time (RT) shifts and -50% to 100% of the IS area as compared to the IS RT and area of the daily continuing calibration standard. All of the SVOC and PAH-SIM analyses met the IS area and RT shift criteria with the following exceptions: Perylene-d12 was greater than 100% in samples 02074008, 02074010 and 02074011. All analytes associated with perylene-d12 were non-detects and therefore, none of the data were qualified on this basis.

### **Compound Identification - Acceptable**

All of the compounds reported in the GC/MS analyses were within the retention time windows, met the USEPA spectral matching criteria and were judged to be acceptable.

### **Laboratory Contact**

The laboratory was not contacted concerning this review.

### **Overall Assessment**

The total number of data points was 2769. Eighty two (3.0%) were qualified as non-detected due to blank contamination and poor spectral match. One hundred eight (3.9%) were qualified as estimated due to values reported below the QL and matrix spike recovery.

All of the samples were analyzed in accordance with technical specifications outlined in the method. The data, as qualified, are acceptable and can be used for all purposes.

### **Data Qualifiers**

- |    |   |  |
|----|---|--|
| U  | - | The analyte was not detected at or above the reported result.  |
| J  | - | The analyte was positively identified. The associated numerical result is an estimate.   |
| R  | - | The data are unusable for all purposes.  |
| N  | - | There is evidence the analyte is present in this sample.   |
| JN | - | There is evidence that the analyte is present. The associated numerical result is an estimate.   |
| UJ | - | The analyte was not detected at or above the reported estimated result. The associated numerical value is an estimate of the quantitation limit of the analyte in this sample. |



**TAYLOR LUMBER  
Sheridan, OR**

**Jul/Aug 2002 Soil  
Sampling Event**

**VALIDATED  
DATA**

**Inorganics, PAH-SIM,  
TCLP,  
Project Notes**



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 10  
1200 Sixth Avenue  
Seattle, WA 98101

September 3, 2002

RECEIVED

SEP-04 2002

Environmental Cleanup Office

Reply To  
Attn Of: OEA-095

**MEMORANDUM**

SUBJECT: Data Validation Report for the Inorganic Analysis of Samples from the Taylor Lumber and Treating Co. site. Case: 30784 SDG: MJ0M58

FROM: Chris Pace, QA Chemist, OEA *CP*

TO: Loren McPhillips, RPM, ECL

CC: Bruce Woods, CLP PO, OEA  
Scott Echols, CH2M HILL

The quality assurance review of nineteen soil samples collected from the above referenced site has been completed. These samples were analyzed for total metals by Liberty Analytical Corp. of Cary, NC. The following samples were reviewed in this validation report:

|        |        |        |        |
|--------|--------|--------|--------|
| MJ0M58 | MJ0M60 | MJ0M61 | MJ0M62 |
| MJ0M63 | MJ0M64 | MJ0M65 | MJ0M66 |
| MJ0M67 | MJ0M68 | MJ0M70 | MJ0M71 |
| MJ0M72 | MJ0M73 | MJ0M74 | MJ0M75 |
| MJ0M77 | MJ0M78 | MJ0M79 | MJ0M80 |

**DATA QUALIFICATIONS**

The following comments refer to the laboratory performance in meeting the Quality Control Specifications outlined in the Contract Laboratory Program (CLP) Statement of Work (SOW) for Inorganic Analysis (ILM04.1) and the USEPA CLP Functional Guidelines for Inorganic Data Review, 2/94.

The conclusions presented herein are based on the information provided for the review.

### **Holding Time/Preservation - Acceptable**

The technical holding time (40 CFR 136) for mercury in water is 28 days from sample collection to analysis and 180 days for the rest of the metals. The Region 10 QA Office applies the water holding time criteria to soil/sediments. The samples were collected on 7/29 and 7/30/02 and properly preserved. All metals were analyzed within 14 days of the sample collection date.

### **Sample Preparation - Acceptable**

The samples were prepared in accordance with the methods used.

### **Initial Calibration - Acceptable**

All of the samples were analyzed for total mercury using Cold Vapor Atomic Absorption Spectroscopy (CVAAS). The initial calibration for mercury met the frequency of analysis and the linearity criteria (correlation coefficients,  $r \geq 0.995$ ).

The rest of the target analytes were analyzed using Inductively Coupled Plasma-Atomic Emission Spectroscopy (ICP-AES). The initial calibration for ICP-AES met the frequency of analysis and the linearity criteria (correlation coefficients,  $r \geq 0.995$ ).

### **Calibration Verification - Acceptable**

The initial and continuing calibration verifications met the criteria for frequency of analysis and recovery criteria of 90-110% and 80-120% for mercury. The recoveries ranged from 92-107% for ICP-AES and from 83-107% for mercury.

### **Detection Limits - Acceptable**

All of the target analytes met the ILM04.1 SOW required quantitation limits. All of the reported results were adjusted for sample amounts analyzed.

### **ICP-AES Interference Check Sample - Acceptable**

The ICP-AES interference check samples (ICS) were analyzed to verify inter-element and background correction factors. The frequency of analysis and recovery criteria (80-120%) were met. The recoveries ranged from 88-112%.

### **Laboratory Control Sample - Acceptable**

The frequency of analysis and the recovery criteria for the laboratory control sample were met. The recoveries ranged from 56-207%.

## Blanks

Procedural blanks were prepared with the samples to indicate potential contamination from the digestion or analytical procedure. If an analyte was found in the associated blank, the sample results were qualified as non-detects, "U", if the analyte concentration is less than five times the analytical value in the blank.

The frequency of analysis of blanks was met. Based on the target analytes detected in the procedural, initial and continuing calibration blanks, the following results were qualified as non-detects, "U":

| Analyte   | Associated Samples   |
|-----------|--|
| beryllium | MJ0M62, MJ0M63, MJ0M65, MJ0M67, MJ0M71, MJ0M72, MJ0M80   |
| cadmium   | MJ0M60, MJ0M61, MJ0M64, MJ0M67, MJ0M68, MJ0M74, MJ0M75<br>MJ0M78, MJ0M80   |
| selenium  | MJ0M58, MJ0M60, MJ0M61, MJ0M62, MJ0M63, MJ0M64, MJ0M65,<br>MJ0M66, MJ0M67, MJ0M68, MJ0M70, MJ0M71, MJ0M72, MJ0M73,<br>MJ0M74 |

## ICP-AES Serial Dilution Analysis

Sample MJ0M61 was analyzed for serial dilution. All of the analytes which exceeded the minimum concentration criterion (50 times the IDL) agreed within 10% difference with the exception of potassium and sodium. Results for potassium and sodium in all samples were qualified as estimated, "J". The "E" qualifiers applied by the laboratory was crossed-out by the reviewer.

### Duplicate Sample Analysis - Acceptable

Sample MJ0M61 was utilized for duplicate analysis. The duplicate results met the frequency of analysis and expanded soil control limit criteria ( $\pm 35\%$  or  $\pm 2\text{CRDL}$ ) for all target analytes. The "\*" qualifiers applied by the laboratory was crossed-out by the reviewer.

### Matrix Spike Analysis

Sample MJ0M61 was used for the spike analysis. The frequency of analysis and recovery criteria (75-125%) were met with the exception of antimony (29%), arsenic (30%), mercury (174%), thallium (0%) and zinc (73%). Due to possible extremely low bias, the detected antimony and thallium results in all samples were qualified as estimated, "J", and non-detects were qualified as unusable, "R". Due to possible low bias, the detected and non-detected arsenic and zinc results in all samples were qualified as estimated, "J/UJ". Due to possible high bias, the detected mercury results in all samples were qualified as estimated, "J", and non-detected results were not qualified. The recoveries for lead and manganese could not be accurately determined because the concentrations native to the sample were greater than four times the spike amount. All of the other spike recoveries were acceptable and ranged from 75-90%.

## Laboratory Contact

The laboratory was not contacted for this review.

## Overall Assessment

The total number of data points was 460. Thirty one (6.7%) were qualified as non-detected due to blank contamination. One hundred twenty (26%) were qualified as estimated due to concentrations below the CRDL, spike and serial dilution analysis. Twenty one (4.6%) were qualified as unusable due to spike analysis.

All of the samples were analyzed in accordance with technical specifications outlined in the SOW. The data, as qualified, are acceptable and can be used for all purposes.

| Data Qualifiers |    |   |
|-----------------|----|---|
| C column        | U  | The analyte was not detected at or above the reported result.   |
| Q column        | U  | The analyte was qualified as non-detected due to blank contamination. The "B" qualifier applied by the laboratory in the "C" column was crossed out by the reviewer.  |
|                 | J  | The analyte was positively identified. The associated numerical result is an estimate.<br><br>Target analytes that were detected at concentrations less than the CRDL and greater than the IDL were qualified as estimated, "J". The "B" qualifiers applied by the laboratory were crossed out by the reviewer. |
|                 | UJ | The analyte was not detected at or above the reported estimated result. The associated numerical value is an estimate of the quantitation limit of the analyte in this sample. The "U" qualifier applied by the laboratory in the "C" column was crossed out by the reviewer.                                   |
|                 | R  | The data are unusable for all purposes. All other qualifiers crossed out by reviewer.   |



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 10  
1200 Sixth Avenue  
Seattle, WA 98101

September 3, 2002

Reply To  
Attn Of: OEA-095

**MEMORANDUM**

SUBJECT: Data Validation Report for the Inorganic Analysis of Samples from the Taylor Lumber and Treating Co. site. Case: 30784 SDG: MJOM59

FROM: Chris Pace, QA Chemist, OEA *CP*

TO: Loren McPhillips, RPM, ECL

CC: Bruce Woods, CLP PO, OEA  
Scott Echols, CH2M HILL

The quality assurance review of one rinsate blank sample collected from the above referenced site has been completed. The sample was analyzed for total metals by Liberty Analytical Corp. of Cary, NC. The following sample was reviewed in this validation report:

MJOM59

**DATA QUALIFICATIONS**

The following comments refer to the laboratory performance in meeting the Quality Control Specifications outlined in the Contract Laboratory Program (CLP) Statement of Work (SOW) for Inorganic Analysis (ILM04.1) and the USEPA CLP Functional Guidelines for Inorganic Data Review, 2/94.

The conclusions presented herein are based on the information provided for the review.

**Holding Time/Preservation - Acceptable**

The technical holding time (40 CFR 136) for mercury in water is 28 days from sample collection to analysis and 180 days for the rest of the metals. The sample was collected on 7/29/02 and properly preserved. All metals were analyzed within 14 days of the sample collection date.

**Sample Preparation - Acceptable**

The samples were prepared in accordance with the methods used.

**Initial Calibration - Acceptable**

All of the samples were analyzed for total mercury using Cold Vapor Atomic Absorption Spectroscopy (CVAAS). The initial calibration for mercury met the frequency of analysis and the linearity criteria (correlation coefficients,  $r \geq 0.995$ ).

The rest of the target analytes were analyzed using Inductively Coupled Plasma-Atomic Emission Spectroscopy (ICP-AES). The initial calibration for ICP-AES met the frequency of analysis and the linearity criteria (correlation coefficients,  $r \geq 0.995$ ).

**Calibration Verification - Acceptable**

The initial and continuing calibration verifications met the criteria for frequency of analysis and recovery criteria of 90-110% and 80-120% for mercury. The recoveries ranged from 93-106% for ICP-AES and from 87-102% for mercury.

**Detection Limits - Acceptable**

All of the target analytes met the ILM04.1 SOW required quantitation limits. All of the reported results were adjusted for sample amounts analyzed.

**ICP-AES Interference Check Sample - Acceptable**

The ICP-AES interference check samples (ICS) were analyzed to verify inter-element and background correction factors. The frequency of analysis and recovery criteria (80-120%) were met. The recoveries ranged from 91-112%.

**Laboratory Control Sample - Acceptable**

The frequency of analysis and the recovery criteria (80-120%) for the laboratory control sample were met. The recoveries ranged from 94-101%.

## Blanks

Procedural blanks were prepared with the samples to indicate potential contamination from the digestion or analytical procedure. If an analyte was found in the associated blank, the sample results were qualified as non-detects, "U", if the analyte concentration is less than five times the analytical value in the blank.

The frequency of analysis of blanks was met. Based on the target analytes detected in the procedural, initial and continuing calibration blanks, the following results were qualified as non-detects, "U":

| Analyte   | Associated Samples |
|-----------|--------------------|
| arsenic   | MJ0M59             |
| beryllium | MJ0M59             |
| magnesium | MJ0M59             |
| sodium    | MJ0M59             |
| vanadium  | MJ0M59             |

Analytes which yielded a negative response in the preparation blank and/or continuing calibration blank(s) at concentrations comparable to or less than the absolute value of the blank(s) were qualified as estimated, "J/UJ", due to possible low bias. The following samples were qualified:

| Analyte  | Associated Samples |
|----------|--------------------|
| selenium | MJ0M59             |

## ICP-AES Serial Dilution Analysis

Not required for rinsate blank samples.

## Duplicate Sample Analysis

Not required for rinsate blank samples.

## Matrix Spike Analysis

Not required for rinsate blank samples.



## Laboratory Contact

The laboratory was not contacted for this review.

## Overall Assessment

The total number of data points was 23. Five (22%) were qualified as non-detected due to blank contamination. Nine (39%) were qualified as estimated due to concentrations below the CRDL and negative blanks.

All of the samples were analyzed in accordance with technical specifications outlined in the SOW. The data, as qualified, are acceptable and can be used for all purposes.

| Data Qualifiers |    |   |
|-----------------|----|---|
| C column        | U  | The analyte was not detected at or above the reported result.   |
| Q column        | U  | The analyte was qualified as non-detected due to blank contamination. The "B" qualifier applied by the laboratory in the "C" column was crossed out by the reviewer.  |
|                 | J  | The analyte was positively identified. The associated numerical result is an estimate.  |
|                 |    | Target analytes that were detected at concentrations less than the CRDL and greater than the IDL were qualified as estimated, "J". The "B" qualifiers applied by the laboratory were crossed out by the reviewer.   |
|                 | UJ | The analyte was not detected at or above the reported estimated result. The associated numerical value is an estimate of the quantitation limit of the analyte in this sample. The "U" qualifier applied by the laboratory in the "C" column was crossed out by the reviewer. |
|                 | R  | The data are unusable for all purposes. All other qualifiers crossed out by reviewer.   |



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 10  
1200 Sixth Avenue  
Seattle, WA 98101

August 30, 2002

Reply To  
Attn Of: OEA-095

**MEMORANDUM**

SUBJECT: Data Validation Report for the Inorganic Analysis of Samples from the Taylor Lumber and Treating Co. site. Case: 30784 SDG: MJ0M69

FROM: Chris Pace, QA Chemist, OEA

*CP*

TO: Loren McPhillips, RPM, ECL

CC: Bruce Woods, CLP PO, OEA  
Scott Echols, CH2M HILL

The quality assurance review of nineteen soil samples collected from the above referenced site has been completed. These samples were analyzed for total metals by Liberty Analytical Corp. of Cary, NC. The following samples were reviewed in this validation report:

|        |        |        |        |
|--------|--------|--------|--------|
| MJ0M69 | MJ0M81 | MJ0M82 | MJ0M83 |
| MJ0M84 | MJ0M85 | MJ0MB8 | MJ0MB9 |
| MJ0MC0 | MJ0MC1 | MJ0MC2 | MJ0MC3 |
| MJ0MC4 | MJ0MC5 | MJ0MC6 | MJ0MC7 |
| MJ0MC8 | MJ0MC9 | MJ0MD0 |        |

**DATA QUALIFICATIONS**

The following comments refer to the laboratory performance in meeting the Quality Control Specifications outlined in the Contract Laboratory Program (CLP) Statement of Work (SOW) for Inorganic Analysis (ILM04.1) and the USEPA CLP Functional Guidelines for Inorganic Data Review, 2/94.

The conclusions presented herein are based on the information provided for the review.

**Holding Time/Preservation - Acceptable**

The technical holding time (40 CFR 136) for mercury in water is 28 days from sample collection to analysis and 180 days for the rest of the metals. The Region 10 QA Office applies the water holding time criteria to soil/sediments. The samples were collected on 7/30 and 7/31/02 and properly preserved. All metals were analyzed within 9 days of the sample collection date.

**Sample Preparation - Acceptable**

The samples were prepared in accordance with the methods used.

**Initial Calibration - Acceptable**

All of the samples were analyzed for total mercury using Cold Vapor Atomic Absorption Spectroscopy (CVAAS). The initial calibration for mercury met the frequency of analysis and the linearity criteria (correlation coefficients,  $r \geq 0.995$ ).

The rest of the target analytes were analyzed using Inductively Coupled Plasma-Atomic Emission Spectroscopy (ICP-AES). The initial calibration for ICP-AES met the frequency of analysis and the linearity criteria (correlation coefficients,  $r \geq 0.995$ ).

**Calibration Verification - Acceptable**

The initial and continuing calibration verifications met the criteria for frequency of analysis and recovery criteria of 90-110% and 80-120% for mercury. The recoveries ranged from 92-110% for ICP-AES and from 103-116% for mercury.

**Detection Limits - Acceptable**

All of the target analytes met the ILM04.1 SOW required quantitation limits. All of the reported results were adjusted for sample amounts analyzed.

**ICP-AES Interference Check Sample - Acceptable**

The ICP-AES interference check samples (ICS) were analyzed to verify inter-element and background correction factors. The frequency of analysis and recovery criteria (80-120%) were met. The recoveries ranged from 89-114%.

**Laboratory Control Sample - Acceptable**

The frequency of analysis and the recovery criteria for the laboratory control sample were met. The recoveries ranged from 57-168%.

## Blanks

Procedural blanks were prepared with the samples to indicate potential contamination from the digestion or analytical procedure. If an analyte was found in the associated blank, the sample results were qualified as non-detects, "U", if the analyte concentration is less than five times the analytical value in the blank.

The frequency of analysis of blanks was met. Based on the target analytes detected in the procedural, initial and continuing calibration blanks, the following results were qualified as non-detects, "U":

| Analyte  | Associated Samples   |
|----------|--|
| cadmium  | MJ0M82, MJ0MC4, MJ0MC9   |
| selenium | MJ0MC1, MJ0MC2, MJ0MC3, MJ0MC4, MJ0MC5, MJ0MC6, MJ0MC7, MJ0MC8, MJ0MC9, MJ0MD0 |
| sodium   | MJ0MC1   |

## ICP-AES Serial Dilution Analysis

Sample MJ0M69 was analyzed for serial dilution. All of the analytes which exceeded the minimum concentration criterion (50 times the IDL) agreed within 10% difference with the exception of potassium. Results for potassium in all samples were qualified as estimated, "J". The "E" qualifiers applied by the laboratory was crossed-out by the reviewer.

## Duplicate Sample Analysis - Acceptable

Sample MJ0M69 was utilized for duplicate analysis. The duplicate results met the frequency of analysis and expanded soil control limit criteria ( $\pm 35\%$  or  $\pm 2\text{CRDL}$ ) for all target analytes. The "\*" qualifiers applied by the laboratory was crossed-out by the reviewer.

## Matrix Spike Analysis

Sample MJ0M69 was used for the spike analysis. The frequency of analysis and recovery criteria (75-125%) were met with the exception of antimony (25%), selenium (74%) and thallium (0%). Selenium only slightly exceeded the recovery criteria and therefore, was not qualified on this basis. Due to possible extremely low bias, the detected antimony and thallium results in all samples were qualified as estimated, "J", and non-detects were qualified as unusable, "R". The recovery for lead could not be accurately determined because the concentration native to the sample was greater than four times the spike amount. All of the other spike recoveries were acceptable and ranged from 85-114%.

## Laboratory Contact

The laboratory was not contacted for this review.

## Overall Assessment

The total number of data points was 437. Fourteen (3.2%) were qualified as non-detected due to blank contamination. Seventy three (17%) were qualified as estimated due to concentrations below the CRDL, spike and serial dilution analysis. Twenty (4.6%) were qualified as unusable due to spike analysis.

All of the samples were analyzed in accordance with technical specifications outlined in the SOW. The data, as qualified, are acceptable and can be used for all purposes.

| Data Qualifiers |    |   |
|-----------------|----|---|
| C column        | U  | The analyte was not detected at or above the reported result.   |
| Q column        | U  | The analyte was qualified as non-detected due to blank contamination. The "B" qualifier applied by the laboratory in the "C" column was crossed out by the reviewer.  |
|                 | J  | The analyte was positively identified. The associated numerical result is an estimate.  |
|                 |    | Target analytes that were detected at concentrations less than the CRDL and greater than the IDL were qualified as estimated, "J". The "B" qualifiers applied by the laboratory were crossed out by the reviewer.   |
|                 | UJ | The analyte was not detected at or above the reported estimated result. The associated numerical value is an estimate of the quantitation limit of the analyte in this sample. The "U" qualifier applied by the laboratory in the "C" column was crossed out by the reviewer. |
|                 | R  | The data are unusable for all purposes. All other qualifiers crossed out by reviewer.   |



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 10  
1200 Sixth Avenue  
Seattle, WA 98101

September 4, 2002

Reply To  
Attn Of: OEA-095

**MEMORANDUM**

SUBJECT: Data Validation Report for the Inorganic Analysis of Samples from the Taylor Lumber and Treating Co. site. Case: 30784 SDG: MJ0M76

FROM: Chris Pace, QA Chemist, OEA *CP*

TO: Loren McPhillips, RPM, ECL

CC: Bruce Woods, CLP PO, OEA  
Scott Echols, CH2M HILL

The quality assurance review of twenty soil samples collected from the above referenced site has been completed. These samples were analyzed for total metals by Liberty Analytical Corp. of Cary, NC. The following samples were reviewed in this validation report:

|        |        |        |        |
|--------|--------|--------|--------|
| MJ0M76 | MJ0M87 | MJ0M88 | MJ0M89 |
| MJ0M90 | MJ0M91 | MJ0M92 | MJ0M93 |
| MJ0M94 | MJ0M95 | MJ0M96 | MJ0M97 |
| MJ0M98 | MJ0M99 | MJ0MA0 | MJ0MA1 |
| MJ0MA2 | MJ0MA3 | MJ0MA4 | MJ0MA5 |

**DATA QUALIFICATIONS**

The following comments refer to the laboratory performance in meeting the Quality Control Specifications outlined in the Contract Laboratory Program (CLP) Statement of Work (SOW) for Inorganic Analysis (ILM04.1) and the USEPA CLP Functional Guidelines for Inorganic Data Review, 2/94.

The conclusions presented herein are based on the information provided for the review.

### **Holding Time/Preservation - Acceptable**

The technical holding time (40 CFR 136) for mercury in water is 28 days from sample collection to analysis and 180 days for the rest of the metals. The Region 10 QA Office applies the water holding time criteria to soil/sediments. The samples were collected on 7/30 and 8/1/02 and properly preserved. All metals were analyzed within 10 days of the sample collection date.

### **Sample Preparation - Acceptable**

The samples were prepared in accordance with the methods used.

### **Initial Calibration - Acceptable**

All of the samples were analyzed for total mercury using Cold Vapor Atomic Absorption Spectroscopy (CVAAS). The initial calibration for mercury met the frequency of analysis and the linearity criteria (correlation coefficients,  $r \geq 0.995$ ).

The rest of the target analytes were analyzed using Inductively Coupled Plasma-Atomic Emission Spectroscopy (ICP-AES). The initial calibration for ICP-AES met the frequency of analysis and the linearity criteria (correlation coefficients,  $r \geq 0.995$ ).

### **Calibration Verification - Acceptable**

The initial and continuing calibration verifications met the criteria for frequency of analysis and recovery criteria of 90-110% and 80-120% for mercury. The recoveries ranged from 91-108% for ICP-AES and from 88-100% for mercury.

### **Detection Limits - Acceptable**

All of the target analytes met the ILM04.1 SOW required quantitation limits. All of the reported results were adjusted for sample amounts analyzed.

### **ICP-AES Interference Check Sample - Acceptable**

The ICP-AES interference check samples (ICS) were analyzed to verify inter-element and background correction factors. The frequency of analysis and recovery criteria (80-120%) were met. The recoveries ranged from 83-120%.

### **Laboratory Control Sample - Acceptable**

The frequency of analysis and the recovery criteria for the laboratory control sample were met. The recoveries ranged from 0-106%.

## Blanks

Procedural blanks were prepared with the samples to indicate potential contamination from the digestion or analytical procedure. If an analyte was found in the associated blank, the sample results were qualified as non-detects, "U", if the analyte concentration is less than five times the analytical value in the blank.

The frequency of analysis of blanks was met. Based on the target analytes detected in the procedural, initial and continuing calibration blanks, the following results were qualified as non-detects, "U": None.

Analytes which yielded a negative response in the preparation blank and/or continuing calibration blank(s) at concentrations comparable to or less than the absolute value of the blank(s) were qualified as estimated, "J/UJ", due to possible low bias. The following samples were qualified:

| Analyte | Associated Samples |
|---------|--------------------|
| silver  | all                |

## ICP-AES Serial Dilution Analysis

Sample MJ0M76 was analyzed for serial dilution. All of the analytes which exceeded the minimum concentration criterion (50 times the IDL) agreed within 10% difference with the exception of copper and potassium. Results for copper and potassium in all samples were qualified as estimated, "J". The "E" qualifiers applied by the laboratory was crossed-out by the reviewer.

## Duplicate Sample Analysis

Sample MJ0M76 was utilized for duplicate analysis. The duplicate results met the frequency of analysis and expanded soil control limit criteria ( $\pm 35\%$  or  $\pm 2\text{CRDL}$ ) for all target analytes with the exception of manganese. Results for manganese in all samples were qualified as estimated, "J". The "\*" qualifiers applied by the laboratory was crossed-out by the reviewer.

## Matrix Spike Analysis

Sample MJ0M76 was used for the spike analysis. The frequency of analysis and recovery criteria (75-125%) were met with the exception of antimony (20%). Due to possible extremely low bias, the detected antimony results in all samples were qualified as estimated, "J", and non-detects were qualified as unusable, "R". The recoveries for lead and manganese could not be accurately determined because the concentrations native to the sample were greater than four times the spike amount. All of the other spike recoveries were acceptable and ranged from 85-108%.



## Laboratory Contact

The laboratory was not contacted for this review.

## Overall Assessment

The total number of data points was 460. One hundred thirty four (29%) were qualified as estimated due to concentrations below the CRDL, spike and serial dilution analysis. Twenty (4.3%) were qualified as unusable due to spike analysis.

All of the samples were analyzed in accordance with technical specifications outlined in the SOW. The data, as qualified, are acceptable and can be used for all purposes.

| Data Qualifiers |    |   |
|-----------------|----|---|
| C column        | U  | The analyte was not detected at or above the reported result.   |
| Q column        | U  | The analyte was qualified as non-detected due to blank contamination. The "B" qualifier applied by the laboratory in the "C" column was crossed out by the reviewer.  |
|                 | J  | The analyte was positively identified. The associated numerical result is an estimate.  |
|                 |    | Target analytes that were detected at concentrations less than the CRDL and greater than the IDL were qualified as estimated, "J". The "B" qualifiers applied by the laboratory were crossed out by the reviewer.   |
|                 | UJ | The analyte was not detected at or above the reported estimated result. The associated numerical value is an estimate of the quantitation limit of the analyte in this sample. The "U" qualifier applied by the laboratory in the "C" column was crossed out by the reviewer. |
|                 | R  | The data are unusable for all purposes. All other qualifiers crossed out by reviewer.   |



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 10  
1200 Sixth Avenue  
Seattle, WA 98101

September 20, 2002

**MEMORANDUM**

SUBJECT: Data Validation Report for the Inorganic Analysis of Samples from the Taylor Lumber and Treating Co. site. Case: 30784 SDG: MJ0MA6

FROM: Chris Pace, QA Chemist, OEA *CP*

TO: Loren McPhillips, RPM, ECL

CC: Bruce Woods, CLP PO, OEA  
Scott Echols, CH2M HILL

The quality assurance review of twenty soil samples collected from the above referenced site has been completed. These samples were analyzed for total metals by Liberty Analytical Corp. of Cary, NC. The following samples were reviewed in this validation report:

|        |        |        |        |
|--------|--------|--------|--------|
| MJ0MA6 | MJ0MB6 | MJ0MB7 | MJ0MD1 |
| MJ0MD3 | MJ0MD4 | MJ0MD5 | MJ0MD6 |
| MJ0MD7 | MJ0MD8 | MJ0MD9 | MJ0ME0 |
| MJ0ME1 | MJ0ME2 | MJ0ME3 | MJ0ME5 |

**DATA QUALIFICATIONS**

The following comments refer to the laboratory performance in meeting the Quality Control Specifications outlined in the Contract Laboratory Program (CLP) Statement of Work (SOW) for Inorganic Analysis (ILM04.1) and the USEPA CLP Functional Guidelines for Inorganic Data Review, 2/94.

The conclusions presented herein are based on the information provided for the review.

**Holding Time/Preservation - Acceptable**

The technical holding time (40 CFR 136) for mercury in water is 28 days from sample collection to analysis and 180 days for the rest of the metals. The Region 10 QA Office applies the water holding time criteria to soil/sediments. The samples were collected between 8/1 and 8/5/02 and properly preserved. All metals were analyzed within 14 days of the sample collection date.

**Sample Preparation - Acceptable**

The samples were prepared in accordance with the methods used.

**Initial Calibration - Acceptable**

All of the samples were analyzed for total mercury using Cold Vapor Atomic Absorption Spectroscopy (CVAAS). The initial calibration for mercury met the frequency of analysis and the linearity criteria (correlation coefficients,  $r \geq 0.995$ ).

The rest of the target analytes were analyzed using Inductively Coupled Plasma-Atomic Emission Spectroscopy (ICP-AES). The initial calibration for ICP-AES met the frequency of analysis and the linearity criteria (correlation coefficients,  $r \geq 0.995$ ).

**Calibration Verification - Acceptable**

The initial and continuing calibration verifications met the criteria for frequency of analysis and recovery criteria of 90-110% and 80-120% for mercury. The recoveries ranged from 96-109% for ICP-AES and from 93-115% for mercury.

**Detection Limits - Acceptable**

All of the target analytes met the ILM04.1 SOW required quantitation limits. All of the reported results were adjusted for sample amounts analyzed.

**ICP-AES Interference Check Sample - Acceptable**

The ICP-AES interference check samples (ICS) were analyzed to verify inter-element and background correction factors. The frequency of analysis and recovery criteria (80-120%) were met. The recoveries ranged from 89-113%.

**Laboratory Control Sample - Acceptable**

The frequency of analysis and the recovery criteria for the laboratory control sample were met. The recoveries ranged from 63-206%.

## Blanks

Procedural blanks were prepared with the samples to indicate potential contamination from the digestion or analytical procedure. If an analyte was found in the associated blank, the sample results were qualified as non-detects, "U", if the analyte concentration is less than five times the analytical value in the blank.

The frequency of analysis of blanks was met. Based on the target analytes detected in the procedural, initial and continuing calibration blanks, the following results were qualified as non-detects, "U":

| Analyte   | Associated Samples             |
|-----------|--------------------------------|
| arsenic   | MJ0MB7, MJ0ME1, MJ0ME2, MJ0ME5 |
| beryllium | MJ0MD6                         |

## ICP-AES Serial Dilution Analysis

Sample MJ0MD3 was analyzed for serial dilution. All of the analytes which exceeded the minimum concentration criterion (50 times the IDL) agreed within 10% difference with the exception of arsenic and potassium. Results for arsenic and potassium in all samples were qualified as estimated, "J". The "E" qualifiers applied by the laboratory was crossed-out by the reviewer.

## Duplicate Sample Analysis - Acceptable

Sample MJ0MD3 was utilized for duplicate analysis. The duplicate results met the frequency of analysis and expanded soil control limit criteria ( $\pm 35\%$  or  $\pm 2\text{CRDL}$ ) for all target analytes. The "\*" qualifiers applied by the laboratory was crossed-out by the reviewer.

## Matrix Spike Analysis

Sample MJ0MD3 was used for the spike analysis. The frequency of analysis and recovery criteria (75-125%) were met with the exception of antimony (50%), arsenic (223%), manganese (33%) and thallium (0%). Due to possible extremely low bias, the detected thallium results in all samples were qualified as estimated, "J", and non-detects were qualified as unusable, "R". Due to possible low bias, the detected and non-detected antimony and manganese results in all samples were qualified as estimated, "J/UJ". Due to possible high bias, the detected arsenic results in all samples were qualified as estimated, "J". All of the other spike recoveries were acceptable and ranged from 78-102%.

**Laboratory Contact**

The laboratory was not contacted for this review.

**Overall Assessment**

The total number of data points was 368. One (0.3%) was qualified as non-detected due to blank contamination. Ninety five (26%) were qualified as estimated due to concentrations below the CRDL, spike and serial dilution analysis. Sixteen (4.3%) were qualified as unusable due to spike analysis.

All of the samples were analyzed in accordance with technical specifications outlined in the SOW. The data, as qualified, are acceptable and can be used for all purposes.

| Data Qualifiers |    |   |
|-----------------|----|---|
| C column        | U  | The analyte was not detected at or above the reported result.   |
| Q column        | U  | The analyte was qualified as non-detected due to blank contamination. The "B" qualifier applied by the laboratory in the "C" column was crossed out by the reviewer.  |
|                 | J  | The analyte was positively identified. The associated numerical result is an estimate.<br><br>Target analytes that were detected at concentrations less than the CRDL and greater than the IDL were qualified as estimated, "J". The "B" qualifiers applied by the laboratory were crossed out by the reviewer. |
|                 | UJ | The analyte was not detected at or above the reported estimated result. The associated numerical value is an estimate of the quantitation limit of the analyte in this sample. The "U" qualifier applied by the laboratory in the "C" column was crossed out by the reviewer.                                   |
|                 | R  | The data are unusable for all purposes. All other qualifiers crossed out by reviewer.   |



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 10  
1200 Sixth Avenue  
Seattle, WA 98101

September 23, 2002

**MEMORANDUM**

SUBJECT: Data Validation Report for the Inorganic Analysis of Samples from the Taylor Lumber and Treating Co. site. Case: 30784 SDG: MJ0MA7

FROM: Chris Pace, QA Chemist, OEA *MP*

TO: Loren McPhillips, RPM, ECL

CC: Bruce Woods, CLP PO, OEA  
Scott Echols, CH2M HILL

The quality assurance review of nine soil samples collected from the above referenced site has been completed. These samples were analyzed for total metals by Liberty Analytical Corp. of Cary, NC. The following samples were reviewed in this validation report:

MJ0MA7  
MJ0MB1  
MJ0MB5

MJ0MA8  
MJ0MB2

MJ0MA9  
MJ0MB3

MJ0MB0  
MJ0MB4

**DATA QUALIFICATIONS**

The following comments refer to the laboratory performance in meeting the Quality Control Specifications outlined in the Contract Laboratory Program (CLP) Statement of Work (SOW) for Inorganic Analysis (ILM04.1) and the USEPA CLP Functional Guidelines for Inorganic Data Review, 2/94.

The conclusions presented herein are based on the information provided for the review.

**Holding Time/Preservation - Acceptable**

The technical holding time (40 CFR 136) for mercury in water is 28 days from sample collection to analysis and 180 days for the rest of the metals. The Region 10 QA Office applies the water holding time criteria to soil/sediments. The samples were collected on 8/2/02 and properly preserved. All metals were analyzed within 21 days of the sample collection date.

**Sample Preparation - Acceptable**

The samples were prepared in accordance with the methods used.

**Initial Calibration - Acceptable**

All of the samples were analyzed for total mercury using Cold Vapor Atomic Absorption Spectroscopy (CVAAS). The initial calibration for mercury met the frequency of analysis and the linearity criteria (correlation coefficients,  $r > 0.995$ ).

The rest of the target analytes were analyzed using Inductively Coupled Plasma-Atomic Emission Spectroscopy (ICP-AES). The initial calibration for ICP-AES met the frequency of analysis and the linearity criteria (correlation coefficients,  $r > 0.995$ ).

**Calibration Verification - Acceptable**

The initial and continuing calibration verifications met the criteria for frequency of analysis and recovery criteria of 90-110% and 80-120% for mercury. The recoveries ranged from 93-108% for ICP-AES and from 96-103% for mercury.

**Detection Limits - Acceptable**

All of the target analytes met the ILM04.1 SOW required quantitation limits. All of the reported results were adjusted for sample amounts analyzed.

**ICP-AES Interference Check Sample - Acceptable**

The ICP-AES interference check samples (ICS) were analyzed to verify inter-element and background correction factors. The frequency of analysis and recovery criteria (80-120%) were met. The recoveries ranged from 81-112%.

**Laboratory Control Sample - Acceptable**

The frequency of analysis and the recovery criteria for the laboratory control sample were met. The recoveries ranged from 58-148%.

## Blanks

Procedural blanks were prepared with the samples to indicate potential contamination from the digestion or analytical procedure. If an analyte was found in the associated blank, the sample results were qualified as non-detects, "U", if the analyte concentration is less than five times the analytical value in the blank.

The frequency of analysis of blanks was met. Based on the target analytes detected in the procedural, initial and continuing calibration blanks, the following results were qualified as non-detects, "U":

| Analyte   | Associated Samples     |
|-----------|------------------------|
| beryllium | MJ0MB2, MJ0MB3, MJ0MB4 |

Analytes which yielded a negative response in the preparation blank and/or continuing calibration blank(s) at concentrations comparable to or less than the absolute value of the blank(s) were qualified as estimated, "J/UJ", due to possible low bias. The following samples were qualified:

| Analyte | Associated Sample |
|---------|-------------------|
| mercury | All               |

## ICP-AES Serial Dilution Analysis

Sample MJ0MB5 was analyzed for serial dilution. All of the analytes which exceeded the minimum concentration criterion (50 times the IDL) agreed within 10% difference with the exception of potassium. Results for potassium in all samples were qualified as estimated, "J". The "E" qualifiers applied by the laboratory was crossed-out by the reviewer.

## Duplicate Sample Analysis - Acceptable

Sample MJ0MB5 was utilized for duplicate analysis. The duplicate results met the frequency of analysis and expanded soil control limit criteria ( $\pm 35\%$  or  $\pm 2\text{CRDL}$ ) for all target analytes.

## Matrix Spike Analysis

Sample MJ0MB5 was used for the spike analysis. The frequency of analysis and recovery criteria (75-125%) were met with the exception of antimony (44%), selenium (44%) and thallium (0%). Due to possible extremely low bias, the detected thallium results in all samples were qualified as estimated, "J", and non-detects were qualified as unusable, "R". Due to possible low bias, the detected and non-detected antimony and selenium results in all samples were qualified as estimated, "J/UJ". The recovery manganese could not be accurately determined because the concentration native to the sample was greater than four times the spike amount. All of the other spike recoveries were acceptable and ranged from 83-105%.



## Laboratory Contact

The laboratory was not contacted for this review.

## Overall Assessment

The total number of data points was 207. Three (1.4%) were qualified as non-detected due to blank contamination. Forty six (22%) were qualified as estimated due to concentrations below the CRDL, spike and serial dilution analysis. Nine (4.3%) were qualified as unusable due to spike analysis.

All of the samples were analyzed in accordance with technical specifications outlined in the SOW. The data, as qualified, are acceptable and can be used for all purposes.

| Data Qualifiers |    |   |
|-----------------|----|---|
| C column        | U  | The analyte was not detected at or above the reported result.   |
| Q column        | U  | The analyte was qualified as non-detected due to blank contamination. The "B" qualifier applied by the laboratory in the "C" column was crossed out by the reviewer.  |
|                 | J  | The analyte was positively identified. The associated numerical result is an estimate.  |
|                 |    | Target analytes that were detected at concentrations less than the CRDL and greater than the IDL were qualified as estimated, "J". The "B" qualifiers applied by the laboratory were crossed out by the reviewer.   |
|                 | UJ | The analyte was not detected at or above the reported estimated result. The associated numerical value is an estimate of the quantitation limit of the analyte in this sample. The "U" qualifier applied by the laboratory in the "C" column was crossed out by the reviewer. |
|                 | R  | The data are unusable for all purposes. All other qualifiers crossed out by reviewer.   |



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**REGION 10**  
1200 Sixth Avenue  
Seattle, WA 98101

September 20, 2002

**MEMORANDUM**

**SUBJECT:** Data Validation Report for the Inorganic Analysis of Samples from the Taylor Lumber and Treating Co. site. Case: 30784 SDG: MJ0ME4

**FROM:** Chris Pace, QA Chemist, OEA *CP*

**TO:** Loren McPhillips, RPM, ECL

**CC:** Bruce Woods, CLP PO, OEA  
Scott Echols, CH2M HILL

The quality assurance review of one field QC sample collected from the above referenced site has been completed. These samples were analyzed for total metals by Liberty Analytical Corp. of Cary, NC. The following sample was reviewed in this validation report:

MJ0ME4

**DATA QUALIFICATIONS**

The following comments refer to the laboratory performance in meeting the Quality Control Specifications outlined in the Contract Laboratory Program (CLP) Statement of Work (SOW) for Inorganic Analysis (ILM04.1) and the USEPA CLP Functional Guidelines for Inorganic Data Review, 2/94.

The conclusions presented herein are based on the information provided for the review.

**Holding Time/Preservation - Acceptable**

The technical holding time (40 CFR 136) for mercury in water is 28 days from sample collection to analysis and 180 days for the rest of the metals. The sample was collected on 8/1/02 and properly preserved. All metals were analyzed within 19 days of the sample collection date.

**Sample Preparation - Acceptable**

The samples were prepared in accordance with the methods used.

**Initial Calibration - Acceptable**

All of the samples were analyzed for total mercury using Cold Vapor Atomic Absorption Spectroscopy (CVAAS). The initial calibration for mercury met the frequency of analysis and the linearity criteria (correlation coefficients,  $r \geq 0.995$ ).

The rest of the target analytes were analyzed using Inductively Coupled Plasma-Atomic Emission Spectroscopy (ICP-AES). The initial calibration for ICP-AES met the frequency of analysis and the linearity criteria (correlation coefficients,  $r \geq 0.995$ ).

**Calibration Verification - Acceptable**

The initial and continuing calibration verifications met the criteria for frequency of analysis and recovery criteria of 90-110% and 80-120% for mercury. The recoveries ranged from 92-109% for ICP-AES and from 100-113% for mercury.

**Detection Limits - Acceptable**

All of the target analytes met the ILM04.1 SOW required quantitation limits. All of the reported results were adjusted for sample amounts analyzed.

**ICP-AES Interference Check Sample - Acceptable**

The ICP-AES interference check samples (ICS) were analyzed to verify inter-element and background correction factors. The frequency of analysis and recovery criteria (80-120%) were met. The recoveries ranged from 84-111%.

**Laboratory Control Sample - Acceptable**

The frequency of analysis and the recovery criteria (80-120%) for the laboratory control sample were met. The recoveries ranged from 90-99%.

## Blanks

Procedural blanks were prepared with the samples to indicate potential contamination from the digestion or analytical procedure. If an analyte was found in the associated blank, the sample results were qualified as non-detects, "U", if the analyte concentration is less than five times the analytical value in the blank.

The frequency of analysis of blanks was met. Based on the target analytes detected in the procedural, initial and continuing calibration blanks, the following results were qualified as non-detects, "U":

| Analyte  | Associated Sample |
|--|-------------------|
| aluminum, chromium, cobalt, magnesium, manganese, mercury, nickel, potassium, sodium, vanadium | MJ0ME4            |

Analytes which yielded a negative response in the preparation blank and/or continuing calibration blank(s) at concentrations comparable to or less than the absolute value of the blank(s) were qualified as estimated, "J/UJ", due to possible low bias. The following samples were qualified:

| Analyte | Associated Sample |
|---------|-------------------|
| arsenic | MJ0ME4            |

## ICP-AES Serial Dilution Analysis

Not required for field QC.

## Duplicate Sample Analysis

Not required for field QC.

## Matrix Spike Analysis

Not required for field QC.

### Laboratory Contact

The laboratory was not contacted for this review.

### Overall Assessment

The total number of data points was 23. Ten (43%) were qualified as non-detected due to blank contamination. Seven (30%) were qualified as estimated due to concentrations below the CRDL and negative blanks.

All of the samples were analyzed in accordance with technical specifications outlined in the SOW. The data, as qualified, are acceptable and can be used for all purposes.

| Data Qualifiers |    |   |
|-----------------|----|---|
| C column        | U  | The analyte was not detected at or above the reported result.   |
| Q column        | U  | The analyte was qualified as non-detected due to blank contamination. The "B" qualifier applied by the laboratory in the "C" column was crossed out by the reviewer.  |
|                 | J  | The analyte was positively identified. The associated numerical result is an estimate.  |
|                 |    | Target analytes that were detected at concentrations less than the CRDL and greater than the IDL were qualified as estimated, "J". The "B" qualifiers applied by the laboratory were crossed out by the reviewer.   |
|                 | UJ | The analyte was not detected at or above the reported estimated result. The associated numerical value is an estimate of the quantitation limit of the analyte in this sample. The "U" qualifier applied by the laboratory in the "C" column was crossed out by the reviewer. |
|                 | R  | The data are unusable for all purposes. All other qualifiers crossed out by reviewer.   |



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 10 LABORATORY  
7411 Beach Dr. East  
Port Orchard, Washington 98366

MEMORANDUM

DATE: October 28, 2002

TO: Loren McPhillips, Project Manager, US EPA Region 10

FROM: Katie Adams, Chemist, US EPA Region 10 *Katie Adams*  
OEA, Manchester Laboratory

cc: Scott Echols, CH2MHill

SUBJECT: Review and Validation of Taylor Lumber site soils and TCLP analyses for metals.

Project Name: Taylor Lumber  
Project Code: TEC-440J  
Account Code: 02T10P50102D10F1LA00

The following is a review and verification of the metals analyses of six soil samples and nine TCLP samples from the Taylor Lumber site. The analyses were performed by the ESAT team following USEPA and laboratory guidelines at the USEPA Manchester Environmental Laboratory, Port Orchard, WA. This review was conducted for the following samples:

Samples

Soil samples:

02314434      02314436      02314480      02314497      02314498      02314499

TCLP samples:

02314479      02314485      02314486      02314487      02314488      02314500      02314501  
02314502      02314503

Data Qualifications

The following comments refer to the ESAT performance in meeting quality control specifications outlined in the *CLP Statement of Work (CLP-SOW) for Inorganic Analysis, rev. ILMO4.1*, the *Quality Assurance Plan for the US EPA Region 10 Manchester Environmental Laboratory, Draft 2000* and the QAPP. The qualifications recommended herein are based on the information provided for the review.

1.0 Timeliness - Acceptable

The technical holding time from the date of collection for metals (excluding mercury) in water is 180 days (40 CFR part 136). Holding times have not been established for solid samples, but the 180 day holding time is applied at this laboratory. Sample collection began on 08/01/02, and analyses were completed on 10/16/02. No data qualification was required on this basis.

2.0 Sample Preparation - Acceptable

The soil samples were prepared for metals analysis on 08/15/02 following EPA Method 3050. The TCLP samples were extracted following EPA Method 1311 on 10/07/02 and 10/08/02. The extracts were digested following EPA Method 3010A on 10/14/02. All sample preparations were performed following Manchester Laboratory protocols. No qualification of the data was required on this basis.

### **3.0 Calibration / Calibration Verification - Acceptable**

#### **ICP-AES (Inductively Coupled Plasma - Atomic Emission Spectroscopy)**

TCLP sample analysis was conducted on 10/16/02 for Ag, As, Ba, Cd, Cr, Pb, and Se. The ICP-AES was calibrated using one blank and a single calibration standard for each required element. The calibrations were performed as required by the appropriate method and SOPs and met acceptance criteria.

Mid-range calibration verification standards are required before and after sample analysis and after every ten samples during analysis. All ICP-AES mid-range calibration verification standards (initial and continuing) met the frequency and recovery acceptance criteria (90-110% recovery of the standard's true value).

A Low Concentration Standard (LCS) was analyzed at the beginning and end of the analysis. All analyses of the LCS met the recovery acceptance criterion (80-120% recovery of the standard's true value).

No qualification was required based on ICP-AES calibration or calibration verification.

#### **GFAA (Graphite Furnace Atomic Absorption Spectroscopy)**

Soil sample analysis was conducted on 08/29/02 and 08/30/02 for Arsenic. The GFAA was calibrated according to the analytical method with a blank and at least four standards. The calibration curves were linear, yielded correlation coefficients greater than 0.995, and met acceptance criteria.

All mid-range and low concentration GFAA calibration verification standards (initial and continuing) that bracketed reported data met the frequency and recovery acceptance criteria (90-110% recovery of the standard's true value, 10% frequency).

No qualification was required based on GFAAS calibration or calibration verification.

### **4.0 Blanks - Not Acceptable**

Procedural blanks were prepared with the samples to assess potential contamination resulting from the sample preparation or analysis. If analyte was detected in the associated procedural blank, the sample results were qualified if the analyte concentration in the unknown samples was less than a factor of ten times the analyte value detected in the procedural blank.

A trace amount of barium was detected in the extraction blanks associated with the TCLP samples (this contamination is consistently observed with TCLP extractions, and has been traced to the glass fiber filters required for the extraction process). All associated sample results for barium were greater than ten times the value found in the procedural blank, with the exception of the result for sample 02314503. The barium result for this sample was qualified "J" to indicate that the results may be biased high due to contamination. No additional qualification of the data was required on the basis of blank analyses.

### **5.0 ICSA Analysis - Not Acceptable**

ICSA and ICSAB standards were prepared and analyzed to verify ICP-AES interelement and background correction factors. Analyses are required at the beginning and end of each ICP-AES analytical sequence. The acceptance criterion is 80%-120% recovery of the true value for analytes present in the standards, and  $\pm$ Reporting Limit (RL) levels for analytes absent from the standards. Analyses of both ICSA and ICSAB standards met the recovery

concentration of 0.9 ug/L in the initial and 1.0 ug/L in the final ICSA analysis, and chromium which exhibited an apparent concentration of -5.3 ug/L in the initial and -6.8 ug/L in the final ICSA analysis. However, similar levels of interferences were not present in the samples. Therefore, no data qualification was required based on the interference check standard analysis.

#### **6.0 Reference Control Sample / Certified Reference Material - Acceptable**

Reference control samples are digested and analyzed with the samples to verify the efficacy of laboratory procedures. The control samples digested for this project met laboratory performance limits; therefore, no qualification of the data was required based on reference control sample performance.

#### **7.0 Duplicate Analysis - Not Acceptable**

Duplicate analysis was performed for the digestion of samples 02314479 and 02314480 (soils). All results above the LCS level were within the  $\pm 20\%$  RPD acceptance criterion. Duplicate analysis was also performed on sample 02314487, representing both the extraction and digestion of this sample. All results met the  $\pm 20\%$  RPD acceptance criteria, with the exception of barium which had an RPD of 23%. The barium results were not qualified, however, because the slight deviation from the acceptance range is likely due to variation in the levels of barium contributed by the filtering process, as described in Section 4.0.

No qualification was required based on duplicate analysis.

#### **8.0 Matrix Spike/Matrix Spike Duplicate Analysis**

Matrix spike/matrix spike duplicate (MS/MSD) sample analyses are performed to provide information about the effect of the sample matrix on digestion and measurement methods. The laboratory requires that matrix spike recoveries for digested samples must be within the limits of 75-125%. Post spike and other undigested spike recoveries are required to be within 85 - 115% of the spike added to the sample.

If the spike amount added is less than one quarter of the sample concentration, the recovery is reported "NA" and the result is not qualified. The recoveries are also reported "NA" for calcium, magnesium, potassium, and sodium because spikes for these elements are not required by the method. Also, if the spike recovery is above 125% or the post spike is above 115%, and the sample result is below the detection limit of the analyte, the result is not qualified.

A post spike recovery in the acceptance range is an indication of the analytical performance but does not represent analyte recovery from the digestion process. A post spike analysis is required for every sample analyzed by GFAAS.

MS/MSD analysis was performed on samples 02314479 (TCLP extracts) and 02314480 (soils). All matrix spike recoveries met the specified acceptance limits, with the following exceptions:

The arsenic spike recoveries for sample 02314480 were 67%/68%. The post spike recovery for this sample was 97%. All associated arsenic results were qualified "J", estimated, to indicate that the results may be biased low.

The silver spike recoveries for sample 02314479 were 21.6%/20.1%. The silver recoveries of an accompanying spiked blank control sample were also low (The digestion method required for TCLP extracts does not recover silver at the levels that are present in spikes performed for TCLP analysis). A post spike was within acceptance limits. All associated silver results were qualified "J", estimated, to indicate possible loss during digestion or analysis.

No other qualifiers were required based on matrix spike recoveries.

#### **9.0 Serial Dilution Analysis - Acceptable**

Sample 02314479 (TCLP extracts) was analyzed by serial dilution to identify potential matrix interferences in the ICP-AES analysis. All analytes that exceeded the minimum concentration criterion (50 times the RL) agreed within



## 10.0 Detection Limits - Acceptable

Sample results that fall below the Reporting Limit (RL) are assigned the value of the Reporting Limit and qualified 'U'. Results above the RL but below the LCS level are reported to two significant figures; sample results above the LCS level are reported to three significant figures.

## 11.0 Overall Assessment of the Data

This quality control review of the data was based on the criteria outlined in the *National Functional Guidelines for Inorganic Data Review (02/94)*. Results below the Reporting Limit (RL) were qualified 'U'. The arsenic results for all soil samples were qualified "J", estimated, due to low matrix spike recoveries. The silver results for all TCLP samples were qualified "J", estimated, due to low matrix spike recoveries. The barium result for TCLP sample 02314503 was qualified "J", estimated, due to possible contamination. No additional qualification was required based on this review.

Below are the definitions for the qualifiers used in the Inorganic area when qualifying data from Inorganic analysis.

### DATA QUALIFIERS

- U - The analyte was not detected at or above the reported result.
- J - The analyte was positively identified. The associated numerical result is an estimate.
- JJ - The analyte was not detected at or above the reported estimated result.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 10 LABORATORY  
7411 Beach Dr. East  
Port Orchard, Washington 98366

September 16, 2002

MEMORANDUM

SUBJECT: Data Verification Report of TCLP Semivolatiles' Results  
for the Taylor Lumber Project Samples 02314479,  
02314485, 02314486, 02314487, 02314488, 02314500,  
02314501, 02314502, and 02314503

FROM: *GH*  
Gerald H. Dodo, Chemist  
USEPA

TO: Loren McPhillips  
USEPA

The following is a data verification report of TCLP semivolatiles analyses' results for soil samples collected for the Taylor Lumber project. The samples were analyzed by the USEPA Region 10 Laboratory ESAT Team located in Manchester, WA using USEPA SW846 Methods 1311 and 8270C. The analyses' results were delivered as ESAT document number ES10-1-1534 under Technical Direction Form 1131. This report covers the samples listed above.

The project code for these samples is TEC-440J. The account number is 02T10P50102D10F1LA00.

Data qualifications

The following comments refer to laboratory performance meeting the Quality Control specifications outlined in the USEPA SW846 Methods 1311, 8270C and the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99).

I. Holding Times: Acceptable

The holding time for the preparation of the TCLP leachate is 14 days from the time of collection. Extraction of the leachates must be performed within seven days of preparation. Extracts

have a holding time of 40 days. All samples were leached, extracted and analyzed within holding time maximums.

## II. GC/MS Tuning and Performance: Acceptable

The tuning summary agreed with the raw data. All decafluorotriphenylphosphine ion abundance met criteria. All sample analyses were preceded by a tune less than 12 hours prior to analysis. No qualifiers were applied on the basis of the tuning data.

## III. Initial Calibration: Acceptable

A five- to nine-point initial calibration was performed on 08/26/02. Correlation coefficients were  $\geq 0.99$ . Average RRFs met the criteria of  $\geq 0.05$ . %RSDs of the RRFs met the criteria of  $\leq 30\%$ . No qualifiers were applied based on the initial calibration.

3-Methylphenol and 4-methylphenol could not be separated in the chromatograms. Calibrations were based on 4-methylphenol only but was judged to be accurate for the quantitation of both compounds and have the same quantitation limit. The TCLP maximum concentration level criteria for the methylphenols as a total is 200 mg/L which none of the leachates of the samples contained.

## IV. Continuing Calibration: Acceptable

The continuing calibration check standard met the criteria for frequency of analysis and RRT windows for all target compounds and surrogates. The RRFs were  $\geq 0.05$  and the accuracy for the target compounds met the criteria of 75-125% of the true value.

## V. Blanks:

Method blanks were prepared and analyzed with each sample TCLP and extraction batch. Target compounds detected in the samples were reported without qualification if the sample result area integration exceeded five times that of the blank for the target compounds. Detected sample results were qualified U if the area integration was below these criteria. The sample concentration or the sample quantitation limit, whichever is greater, was reported as the qualified result.

VI. Surrogates: Acceptable

The SW846 Method 8270C and the Functional Guidelines specifications for surrogate recoveries were applied. A 50-150% recovery criterion was applied for pyrene-d10. The recoveries met the criteria. No qualifiers were applied based on the surrogates.

VII. Matrix Spike/Matrix Spike Duplicate (MS/MSD):

An MS/MSD analysis was performed using the leachate of sample 02314479 (S1/S2). The MS/MSD criteria as described in the CLP Statement of Work and the Region 10 acceptance ranges (50-150% recovery,  $\leq 50\%$  relative percent difference, RPD) were applied. The recoveries met the criteria, therefore, no qualifiers were applied based on the MS/MSD results.

VIII. Internal Standard Performance: Acceptable

The retention time variations of all internal standards were within 30 seconds of the continuing calibration standards. The %areas of all internal standards were within the specified 50% to 200% of the continuing calibration standards. No qualifiers were applied based on the internal standards.

IX. Target Compound Identification: Acceptable

All detected target compounds' relative retention times were within acceptable limits of the related standards in the continuing calibration standard. Criteria were met for mass spectral ion matching and ion abundance matching or the mass spectra were judged acceptable.

X. Compound Quantitation: Acceptable

Calculations were based on the initial calibration. Sample quantitation limits were adjusted appropriately as according to sample amounts and calibration data. Detected results below the sample quantitation limits were qualified J.

Overall Assessment for the Case

The usefulness of the data is based on the criteria outlined in the USEPA SW846 Methods 1311, 8270C and the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99). All requirements for data qualifiers from the preceding sections were accumulated. Each sample data summary sheet and each compound was checked for positive or

negative results. From this overall need for data qualifiers for each analysis was determined. In cases where more than one of the preceding sections required data qualifiers, the most restrictive qualifier has been added to the data.

In general, all unqualified data can be used without restriction. The usefulness of qualified data should be treated according to the severity of the qualifier. Should questions arise regarding the qualification of data and its relation to the usefulness, the reader is encouraged to contact Gerald Dodo at the Region 10 laboratory, phone number (360) 871-8728.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 10 LABORATORY  
7411 Beach Dr. East  
Port Orchard, Washington 98366

MEMORANDUM

DATE: October 29, 2002  
TO: Loren McPhillips, Project Manager, US EPA Region 10  
FROM: Katie Adams, Chemist, US EPA Region 10 *Katie Adams*  
OEA, Manchester Laboratory  
cc: Scott Echols, CH2MHill  
SUBJECT: Review and Verification of Taylor Lumber site water analyses for metals.

Project Name: Taylor Lumber  
Project Code: TEC-440J  
Account Code: 02T10P50102D10F1LA00

The following is a review and verification of the metals analyses of eleven water samples from the Taylor Lumber site. The analyses were performed by the ESAT team following USEPA and laboratory guidelines at the USEPA Manchester Environmental Laboratory, Port Orchard, WA. This review was conducted for the following samples:

Samples

|          |          |          |          |          |          |          |
|----------|----------|----------|----------|----------|----------|----------|
| 02314447 | 02314448 | 02314449 | 02314450 | 02314451 | 02314452 | 02314453 |
| 02314454 | 02314455 | 02314456 | 02314457 |          |          |          |

Data Qualifications

The following comments refer to the ESAT performance in meeting quality control specifications outlined in the *CLP Statement of Work (CLP-SOW) for Inorganic Analysis, rev. ILMO4.1*, the *Quality Assurance Plan for the US EPA Region 10 Manchester Environmental Laboratory, Draft 2000* and the QAPP. The qualifications recommended herein are based on the information provided for the review.

1.0 Timeliness - Acceptable

The technical holding time from the date of collection for metals (excluding mercury) in water is 180 days (40 CFR part 136). Sample collection began on 08/01/02, and analyses were completed on 10/23/02. No data qualification was required on this basis.

2.0 Sample Preparation

The samples as received at the laboratory contained significant amounts of sediment. An initial digestion of the samples produced results with unacceptable levels of variability for copper and chromium, and poor spike recoveries for arsenic. After consulting with the project officer, the samples were filtered through a 0.8 um filter, and the liquid portion was digested and analyzed for total metals. It should be noted that the samples had been preserved and stored with nitric acid, so that the analyte levels in the liquid portion also reflect metals that had leached from the sediments present in the original sample.



All sample preparations were performed following Manchester Laboratory protocols. No qualification of the data was required on this basis.

#### **3.0 Calibration / Calibration Verification - Acceptable**

##### **ICP-MS (Inductively Coupled Plasma - Mass Spectrometry)**

Sample analysis was conducted on 10/22/02 and 10/23/02 for Cr, Cu, and As. The ICP-MS was calibrated according to the analytical method with a blank and at least three standards. The calibration curves were linear, yielded correlation coefficients greater than 0.995, and met acceptance criteria.

Mid-range calibration verification standards are required before and after sample analysis and after every ten samples during analysis. All ICP-MS mid-range calibration verification standards (initial and continuing) met the frequency and recovery acceptance criteria (90-110% recovery of the standard's true value).

A Low Concentration Standard (LCS) was analyzed before and after sample analysis and after every ten samples during analysis. All analyses of the LCS met the recovery acceptance criterion (80-120% recovery of the standard's true value).

No qualification was required based on ICP-MS calibration or calibration verification.

#### **4.0 Blanks - Acceptable**

Procedural blanks were prepared with the samples to assess potential contamination resulting from the sample preparation or analysis. If analyte was detected in the associated procedural blank, the sample results were qualified if the analyte concentration in the unknown samples was less than a factor of ten times the analyte value detected in the procedural blank.

The procedural blanks did not contain detectable levels of the analytes of interest. No qualification of the data was required on the basis of blank analyses.

#### **5.0 ICSA Analysis - Not Applicable**

ICP-AES analysis was not performed for these samples; therefore, ICSA analysis was not required.

#### **6.0 Reference Control Sample / Certified Reference Material - Acceptable**

Reference control samples are digested and analyzed with the samples to verify the efficacy of laboratory procedures. The control samples digested for this project met laboratory performance limits; therefore, no qualification of the data was required based on reference control sample performance.

#### **7.0 Duplicate Analysis - Acceptable**

Duplicate analysis was performed on sample 02314452. All results above the LCS level were within the  $\pm 20\%$  RPD acceptance criterion. No qualification was required based on duplicate analysis.

#### **8.0 Matrix Spike/Matrix Spike Duplicate Analysis**

Matrix spike/matrix spike duplicate (MS/MSD) sample analyses are performed to provide information about the effect of the sample matrix on digestion and measurement methods. The laboratory requires that matrix spike recoveries for digested samples must be within the limits of 75-125%. Post spike and other undigested spike recoveries are required to be within 85 - 115% of the spike added to the sample.

If the spike amount added is less than one quarter of the sample concentration, the recovery is reported "NA" and the result is not qualified. The recoveries are also reported "NA" for calcium, magnesium, potassium, and sodium

because spikes for these elements are not required by the method. Also, if the spike recovery is above 125% or the post spike is above 115%, and the sample result is below the detection limit of the analyte, the result is not qualified.

A post spike recovery in the acceptance range is an indication of the analytical performance but does not represent analyte recovery from the digestion process. A post spike analysis is required for every sample analyzed by GFAAS.

Matrix spike analysis was performed on sample 02314452. There was not sufficient sample to perform a matrix spike duplicate analysis. All matrix spike recoveries met the specified acceptance limits. No qualification was required on the basis of matrix spike recovery.

#### 9.0 Serial Dilution Analysis - Acceptable

Sample 02314452 was analyzed by serial dilution to identify potential matrix interferences in the ICP-MS analysis. All analytes that exceeded the minimum concentration criterion (50 times the RL) agreed within 10% difference. On this basis, no qualification of the data was required.

#### 10.0 Detection Limits - Acceptable

Sample results that fall below the Reporting Limit (RL) are assigned the value of the Reporting Limit and qualified 'U'. Results above the RL but below the LCS level are reported to two significant figures; sample results above the LCS level are reported to three significant figures.

#### 11.0 Overall Assessment of the Data

This quality control review of the data was based on the criteria outlined in the *National Functional Guidelines for Inorganic Data Review (02/94)*. These samples were filtered before digestion and analysis; however, the samples were preserved with acid prior to filtration, so the reported values also reflect metals that had leached from the sediments present in the samples. Results below the Reporting Limit (RL) were qualified 'U'. No additional qualification was required based on this review.

Below are the definitions for the qualifiers used in the Inorganic area when qualifying data from Inorganic analysis.

#### DATA QUALIFIERS

- |    |   |  |
|----|---|--|
| U  | - | The analyte was not detected at or above the reported result.                          |
| J  | - | The analyte was positively identified. The associated numerical result is an estimate. |
| UJ | - | The analyte was not detected at or above the reported estimated result.                |



**TAYLOR LUMBER  
Sheridan, OR**

**September 2002 GW  
Sampling Event**

**VALIDATED DATA**

**CONV, PAH-SIM,  
Pentachlorophenol,  
Inorganics, SVOCs,  
Project Notes**



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 10 LABORATORY  
7411 Beach Dr. East  
Port Orchard, Washington 98366

September 27, 2002

MEMORANDUM

SUBJECT: Peer Review and Data Verification Report of Low Level  
Polynuclear Aromatic Hydrocarbon Results for the Taylor  
Lumber Project Samples 02344550 thru 02344562, 02354000  
thru 02354007, 02354011, 02354012, and 02364100 thru  
02364105

FROM: Gerald H. Dodo, Chemist  
USEPA

TO: Loren McPhillips  
USEPA

CC: Scott Echols  
CH2M Hill

The following is a peer review and data verification report of the low level polynuclear aromatic hydrocarbon (PAH) analyses' results for water samples collected for the Taylor Lumber project. The samples were analyzed at the USEPA Region 10 Laboratory using USEPA SW846 Method 8270C in the selected ion mode. This report covers the samples listed above.

The project code for these samples is TEC-440K and the account number is 02T10P50102D10F1LA00.

Data qualifications

The following comments refer to the laboratory performance in meeting the Quality Control specifications outlined in the USEPA Method 8270C and the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99).

I. Holding Times: Acceptable

The samples were extracted within seven days from the time of collection. The extracts were analyzed within 40 days from

the time of preparation. No qualifiers were applied based on holding times.

## II. GC/MS Tuning and Performance: Acceptable

The tuning summary agreed with the raw data. All decafluorotriphenylphosphine ion abundance met criteria. All sample analyses were preceded by a tune less than 12 hours prior to analysis. No qualifiers were applied on the basis of the tuning data.

## III. Initial Calibration: Acceptable

Six to seven-point initial calibrations were performed on 09/17/02 and 09/23/02. Average RRFs met the criteria of  $\geq 0.05$ . Correlation coefficients were  $\geq 0.99$ . %RSDs of the RRFs met the criteria of  $\leq 30\%$ . No qualifiers were applied based on the initial calibration.

## IV. Continuing Calibration:

The continuing calibration check standard met the criteria for frequency of analysis and RRT windows for all target compounds and surrogates. The RRFs were  $\geq 0.05$  and the accuracy for the target compounds met the criteria of 75-125% except for the following.

09/18/02 Samples 02344550 thru 02344560.

Dibenzo(ah)anthracene resulted with  $< 75\%$  of the true value. The associated sample results for this compound were non-detected and were qualified UJ.

09/23/02 Samples 02364100 thru 02364105, 02354012, Diluted Reanalyses for Sample 02344550, Matrix Spikes 02354005S1, 02354005S2, 02354011S1, and 02354011S2.

Indeno(1,2,3-cd)pyrene resulted with  $> 125\%$  of the true value. The associated sample results for this compound were non-detected, therefore, no qualifiers were applied based on this continuing calibration check since the high result does not indicate a problem with the quantitation limits.

## V. Blanks:

Method blanks were prepared and analyzed with the sample extraction batches. Target compounds detected in the samples were reported without qualification if the sample result area integration exceeded five times that of the blank. Detected

sample results were qualified U if the area integration was below this criterion. The sample concentration or the sample quantitation limit, whichever is greater, was reported as the qualified result.

VI. Surrogates: Acceptable

Method 8270C and the Functional Guidelines specifications for surrogate recoveries were applied. A criterion of 50-150% recovery for pyrene-d10 was applied as well. The surrogate recoveries met the criteria. No qualifiers were applied based on the surrogates.

VII. Matrix Spike/Matrix Spike Duplicate (MS/MSD):

MS/MSD analyses were performed using samples 02354005 and 02354011 (S1/S2). The Region 10 acceptance ranges (50-150% recovery,  $\leq 50\%$  relative percent difference, RPD) were applied. 2-Methylnaphthalene resulted with  $< 50\%$  recoveries for both MS/MSD sets. The results for this compound for samples 02354005 and 02354011 were qualified J if detected and UJ if non-detected.

VIII. Internal Standard Performance: Acceptable

The retention time variations of all internal standards were within 30 seconds of the continuing calibration standard. The %areas of all internal standards were within the specified 50% to 200% of the continuing calibration standard. No qualifiers were applied based on the internal standards.

IX. Target Compound Identification: Acceptable

All detected target compounds' relative retention times were within acceptable limits of the related standards in the continuing calibration standard. Criteria were met for mass spectral ion matching and ion abundance matching or the mass spectra were judged acceptable.

X. Compound Quantitation: Acceptable

Calculations were based on the initial calibration. Sample quantitation limits were adjusted appropriately as according to sample amounts and calibration data. Detected results below the sample quantitation limits were qualified J.

## Overall Assessment for the Case

The usefulness of the data is based on the criteria outlined in the USEPA Method 8270C and the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99). All requirements for data qualifiers from the preceding sections were accumulated. Each sample data summary sheet and each compound was checked for positive or negative results. From this overall need for data qualifiers for each analysis was determined. In cases where more than one of the preceding sections required data qualifiers, the most restrictive qualifier has been added to the data.

In general, all unqualified data can be used without restriction. The usefulness of qualified data should be treated according to the severity of the qualifier. Should questions arise regarding the qualification of data and its relation to the usefulness, the reader is encouraged to contact Gerald Dodo at the Region 10 laboratory, phone number (360) 871-8728.

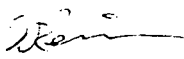


UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 10 LABORATORY  
7411 Beach Dr. East  
Port Orchard, Washington 98366

17 October 2002

**MEMORANDUM**

**SUBJECT:** Peer Review and Validation Memo Quality Assurance Narrative for Taylor Lumber Water Samples Analyzed for Pentachlorophenol.

**FROM:** Steve Reimer   
Chemist

**TO:** Loren McPhillips  
Project Officer

This memo covers water samples from Taylor Lumber for pentachlorophenol. Extraction and analysis of the samples was performed by EPA Method 515.3. The samples included in this memo are #'s 02344550 - 02344562, 02354000 - 02354008, 02354011 - 02354012 and 02364100 - 02364105.

Project Code: TEC-440K. Account Code: 02T10P50102D10F1LA00

Holding Times: Acceptable.

The samples were collected 21, 22, 26 and 27 August 2002. The samples were extracted on 30 August, 9 September and again on 26 September 2002. The sample extracts and other associated extracts were screened on 5 September 2002 and analyzed 13 September and again on 2 October 2002.

Instrument Performance: Acceptable.

An Agilent 6890 gas chromatograph (GC) using dual micro electron capture (EC) detectors with DB-35MS and DB-XLB narrow-bore capillary columns (0.25mm ID x 30m) was used for this analysis.

Retention Time Windows: Acceptable.  
Retention times for the standards were within the windows set by the initial calibration.

Surrogate Retention Times: Acceptable.  
Where detected, all surrogates appeared within their respective windows in all samples.

Calibration:

Initial Calibration: Acceptable.

Procedural standards were used with thirty microliter injections and an internal standard to construct six point curves. Correlation coefficients were greater than 0.99 or RSD  $\leq$  20%.

System Performance: Acceptable.

Peak symmetry for 4-nitrophenol was within normal parameters.

Analytical Sequence: Acceptable.

Continuing Calibration: Acceptable.

The continuing calibration standards were within the 30% difference criterion for both columns. Internal standard peak heights were within the 30% criterion.

Method Blank Analysis: Acceptable:

Method blanks; OBW2242D1, OBW2242D2, OBW2252D1 and OBW2269D1, were analyzed with the water samples. No peaks occurred at or above the quantitation limit in any of the blanks.

Surrogate Recovery: Acceptable

2,4-Dichlorophenylacetic acid (DCAA) was added as a surrogate to each of the herbicides. All samples were screened using an GC-AED by EPA Method 8085. Those samples with detectable PCP were diluted to the appropriate final volume for analysis by GC-ECD. For seven of the samples the dilution required prevented the detection of the surrogate. Recovery averaged 109% where the recovery could be determined. The relative standard deviation was 4.7%. These were within the range expected.

Matrix Spike/Matrix Spike Duplicate: Acceptable

Two pairs of matrix spiked samples were prepared from samples 02354005 and 02354011. The spike level was 5.3  $\mu$ g/L. The recoveries were within the expected range of 70 to 130% with an RSD less than 30%.

Fortified Blank Samples: Acceptable

A fortified blank was prepared along with each batch of samples. These were also used as

the calibration check standard. The recoveries were within the expected range (70% to 130%).

Compound Identification/Quantitation:

Eighteen of the samples contained detectable levels of pentachlorophenol, sixteen of those were above the quantitation limit of 0.50 µg/L. The highest levels were found in samples 02344551 and 02344552 with levels of 28 µg/L and 250 µg/L. Duplicates were run on samples 02344558 and 02344561 with good agreement, 17 and 18 µg/L and 14 and 12 µg/L respectively.

Overall Assessment/Data Use:

Acceptable for use with no qualifiers assigned. The data was evaluated using the guidelines set out in the "Laboratory Data Validation Functional Guidelines for Evaluating Organic Analyses" (Dec. '94).



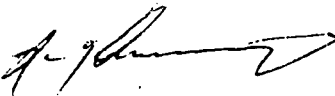


UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 10 LABORATORY  
7411 Beach Dr. East  
Port Orchard, Washington 98366

October 9, 2002

MEMORANDUM

SUBJECT: Case Narrative for the Pentachlorophenol Results for Taylor Lumber  
Samples 02344550 - 02344562, 02354000 - 02354008, 02354011 -  
02354012, and 02364100 - 02364105

FROM: Randy Cummings, USEPA Chemist 

REVIEWED BY: Steven Reimer, USEPA Chemist

TO: Loren McPhillips, Project Officer, USEPA

The following is a case narrative of the Pentachlorophenol (PCP) analytical results for water samples collected for the Taylor Lumber and Treating Groundwater Monitoring project. The samples were extracted and analyzed by the USEPA Region 10 Laboratory located at Manchester, Washington. USEPA Method 515.3 (SOP OR\_C515A) was used for the extraction and analysis. The method was modified from the SOP in the following manner: 1) 40mL Volatile Organic Analysis (VOA) vials were used instead of the 60mL vials suggested, 2) No dechlorination reagent was added to the samples since they did not come from a chlorinated system, 3) 30mL sample size was used instead of the 40mL suggested (because of the sample container size), 4) 3mL of MTBE was used for the extraction instead of the 4mL suggested (to compensate for the sample volume difference), 5) the hydrolysis step was skipped (because ethers of PCP are not susceptible to hydrolysis), and 6) standards and surrogates were prepared in a manner proportional with the samples.

An initial demonstration of capability study (IDC) was previously performed to ensure the modifications did not compromise data quality. The IDC data was archived with Baxter (January 2002, project code ESD-069A and account number 0203B10P90102E).

This report covers the samples listed above. The project code for these samples is TEC-440K and the account number is 02T10P50102D10F1LA00.

Data qualifications

The following comments refer to the laboratory performance in meeting the Quality Control specifications outlined in USEPA SW 846 and/or the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (10/99).

I. Holding Times: Acceptable

The samples were extracted within 14 days of collection, and analyzed within 14 days of extraction. Method 515.3 allows a 14 day holding period for extraction and a 14 day holding period for analysis.

II. Initial Calibration: Acceptable

Initial calibrations were performed using a Model 6890 Agilent plus series gas chromatograph (GC-Thor). DB-35MS and DB-XLB 30m X 0.25 mm internal diameter columns were used. The columns were coupled to a pressure temperature- vaporization inlet system (PTV) and to dual micro electron capture detectors ( $\mu$ ECDs).

Thirty microliter injections were used. The procedural standard preparation technique was employed to construct five to six calibration levels using an internal standard calibration curve. Calibrations were performed on 09/12/02 and 10/02/02.

Linear least squares fit or average fit functions were applied with correlation coefficients of  $\geq 0.99$  or  $RSD \leq 20\%$ . Each calibration level was requantified with the result fit against expected values. A  $\leq 30\%$  relative percent difference (RPD) criterion was applied to each calibration level.

Comparison of a secondary check standard against the calibration standards exhibited a variance of more than 30% difference. This difference was greater than expected. Upon further investigation it was determined that the calibration standards were biased low for PCP by about 30%, resulting in the samples being biased high. A new calibration set was extracted on 09/30/02. The instrument was calibrated using the new standard set on 10/02/02. The second source standard PCP quantity was within expectation during this analysis.

III. System Performance Check: Acceptable

Peak symmetry for 4-Nitrophenol was within specifications.

IV. Calibration Checks: Acceptable

The calibration checks met the criteria for frequency of analysis and retention time (RT) windows. The percent difference (%D) amount criterion of  $\leq 30\%$  from the expected values was met for each analytical sequence. Internal standard peak height count deviations for the calibration checks were  $\leq 30\%$  of the calibration average.

V. Method Blanks: Acceptable

A set of method blanks was prepared and analyzed with each sample extraction batch. No target compounds were determined above the reporting level or greater than one-fifth any reported value.

VI. Sample Analysis: Acceptable

The samples were screened prior to the ECD analysis using a gas chromatograph with a PTV inlet and VICI VB-5 30m X 0.25mm ID X 0.25  $\mu$ m df interfaced to an HP-2350 atomic emission detector (GC-AED, Horus). The screen generally followed SW-846 Method 8085

protocol using Compound Independent Calibration (CIC) combined with a single level analyte calibration. PCP was estimated from the analyte calibration although CIC criteria for that compound was also met.

Internal standard peak height count deviations for the samples were  $\leq 30\%$  of the calibration average for all reported data.

VII. Surrogates Recovery: Acceptable

2,4-Dichlorophenylacetic acid (DCAA) was added to each sample as a surrogate. Recoveries were generally calculated from the average result of the two gas chromatographic columns used. Samples that had a significant PCP presence had interference from a tetrachlorophenol compound (most likely 2,3,4,6-Tetrachlorophenol) on the "B" channel, DB-35ms column. In those cases, only the results from "A" channel, DB-XLB column, were reported.

Dilutions were calculated from the atomic emission detector analysis and only the diluted extracts were analyzed by GC-ECD. Therefore, the surrogate recoveries from the ECD analysis were not calculated or reported for samples requiring dilution. In those cases no surrogate recovery was reported. Affected samples include 02344551, 02344552, 02344556, 02344557, 02344558, 02344561 and 02344562.

The average recovery for DCAA in samples, blanks and spiked samples, where the recovery could be determined, was 109% with a relative standard deviation (RSD) of 4.7%. These recovery and precision data were within the range of expectation. No qualifiers were applied based on surrogate recoveries.

VIII. Fortified Blank Samples: Acceptable

The method used employs procedural standards. Procedural standards are prepared identically to fortified blanks. Therefore batch calibration check standards can also be used as fortified blanks.

Calibration check standards were extracted with each extraction batch. Recoveries met the 70 - 130% recovery criteria for PCP.

One check standard was produced using a second source standard. This check standard was reported as a Fortified Blank.

IX. Matrix Spike Samples: Acceptable

Two sets of matrix spiked samples were prepared. Samples 02354005 and 02354011 were used. The spiking level for PCP was 5.3 $\mu$ g/L. The matrix spike recoveries were calculated for the analysis of 09/12/02 since the matrix samples were spiked with a standard from that calibration set. PCP recoveries were within the range of expectation (70 - 130% recovery), and had a relative standard deviation within 30%.

X. Duplicate Sample Analysis: Acceptable

Samples 02344558 and 02344561 were chosen for duplicate analysis based on sample analysis results. They were extracted after the generally accepted 14 day holding period (35 days). The relative percent difference (RPD) between samples 02344558 was 6%. The relative percent difference (RPD) between samples 02344561 was 15%. Both of these result were with the range of expectation.

XI. Target Compound Identification and Quantification: Acceptable

Detected target compounds were based on retention time comparisons against calibration standards and relative percent difference (RPD) between the results from the two columns used. An RPD of at least 40% was used as a biases for compound confirmation. Quantification as done by averaging the result from the two columns used. Compound quantified below the PQL were qualified as estimates.

XII. Overall Assessment for the Case

The usefulness of the data is based on the criteria outlined in USEPA SW 846 and/or the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, 10/99. All requirements for data qualifiers from the preceding sections were accumulated. Each sample data summary sheet and each compound was checked for positive or negative results. From this, the overall need for data qualifiers for each analysis was determined. In cases where more than one of the preceding sections required data qualifiers, the most restrictive qualifier has been added to the data.

In general, all unqualified data can be used without restriction. The usefulness of qualified data should be treated according to the severity of the qualifier. Should questions arise regarding the qualification of data and its relation to the usefulness, the reader is encouraged to contact Randy Cummings at the Region 10 laboratory, phone number (360) 871-8707.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 10  
1200 Sixth Avenue  
Seattle, Washington 98101


IN REPLY

REFER TO: OEA-095

October 15, 2002

MEMORANDUM

SUBJECT: Taylor Lumber and Treating, CLP Metals Analysis, Data  
Validation  
Case: 30869  
SDG: MJ0MJ1

FROM:  Laura Castrilli, Chemist  
Quality Assurance, Monitoring & Assessment Unit, OEA

TO: Loren McPhillips, Remedial Project Manager  
Office of Environmental Cleanup

CC: Bruce Woods, Region 10 CLP TPO  
Trish Larson, CH2M HILL  
Scott Echols, CH2M HILL

The following is a validation of ICP-AES and mercury analyses of thirteen water samples from the Taylor Lumber and Treating site. The analyses were performed following the USEPA Contract Laboratory Program Statement of Work for Inorganics Analysis Multi-media, Multi-Concentration, ILM04.1. Analyses were conducted by Sentinel Inc., Huntsville, Alabama. This validation was conducted for the following samples:

|        |        |        |        |        |        |        |
|--------|--------|--------|--------|--------|--------|--------|
| MJ0MJ1 | MJ0MJ5 | MJ0MJ7 | MJ0MJ9 | MJ0MP8 | MJ0MQ0 | MJ0MQ2 |
| MJ0MJ4 | MJ0MJ6 | MJ0MJ8 | MJ0MK0 | MJ0MP9 | MJ0MQ1 |        |

**Data Qualifications**

The following comments refer to Sentinel's performance in meeting quality control specifications outlined in the *CLP Statement of Work (CLP-SOW) for Inorganic Analysis, rev. ILM04.1*. The comments presented herein are based on the information provided for the review.

**1.0 Timeliness - Acceptable**

The technical (40 CFR part 136) holding time from the date of collection for mercury in water is 28 days. The holding time for the remaining metals in water is 180 days. The samples were collected between 08/21/02 and 08/27/02. Mercury analyses were completed on 09/04/02. ICP-AES analyses were completed on 09/04/02. All analyses

*October 15, 2002*

were conducted within the technical water holding times, therefore no qualification was made based on holding time. Note that samples MJ0MJ4 through MJ0MJ8 were presumed to have a sampling date of 08/21/02 - no sampling date was recorded on the traffic report/chain of custody form (TR/COC) but the sample immediately above these samples on the TR/COC had a sampling date of 08/21/02.

## **2.0 Sample Preparation - Acceptable**

The samples were prepared for ICP-AES and mercury analyses on 09/03/02. No qualification was made based on sample preparation.

## **3.0 Calibrations/Calibration Verifications - Acceptable**

The samples were analyzed for mercury by CVAAS on 09/04/02. The initial calibration included one blank and six standards. The curve was linear with a correlation coefficient greater than 0.995.

The samples were analyzed by ICP-AES on 09/03/02 (all analytes except silver) and 09/04/02 (silver). The instrument was standardized each day of analysis according to the analytical method using one blank and one calibration standard for each element.

All ICP-AES and CVAAS (mercury) calibrations were performed as required and met the acceptance criteria; therefore, no qualification was made on this basis.

Calibration verification samples are required before and after sample analysis and after every 10 samples during analysis. Mercury recoveries must be within 80-120%. Other metal recoveries must be within 90-110%.

All ICP-AES and CVAAS (mercury) calibration verification (initial and continuing) samples bracketing reported sample results met the frequency and recovery criteria; therefore no qualification was made based on ICP-AES or CVAAS calibration verification.

## **4.0 Laboratory Control Samples - Acceptable**

Laboratory Control samples (LCS) are digested and analyzed along with the samples to verify the efficiency of laboratory procedures. All recoveries associated with reported sample results met the acceptance criteria for control samples; therefore no qualification was made on this basis.

## **5.0 Blanks -**

Procedural blanks were prepared with the samples to show potential contamination from the digestion or analytical procedure. If an analyte was found in the associated blank, the sample results were

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qualified if the analyte concentration was less than five times the analytical value in the blank.

Arsenic was detected in the preparation blank. Aluminum, chromium, iron, and magnesium in the preparation blank had negative results with absolute values greater than the instrumental detection limit (IDL). Arsenic and magnesium were detected in one or more continuing calibration blanks (CCBs). Aluminum, chromium, iron, magnesium, and sodium in one or more CCBs had negative results with absolute values greater than the IDLs.

Based on blank contamination, the following qualifications were made:

- ♦ Aluminum in all samples except MJ0MJ4 and MJ0MJ7 was qualified 'J', estimated.
- ♦ Arsenic in samples MJ0MJ4, MJ0MJ9, and MJ0MP9 was qualified 'U', undetected.
- ♦ Chromium in all samples was qualified 'J', estimated, or 'UJ', estimated detection limit.
- ♦ Iron in all samples except MJ0MJ4, MJ0MJ6, and MJ0MJ7 was qualified 'J', estimated, or 'UJ', estimated detection limit.

The remaining sample results were greater than five times the associated blank levels (or were already undetected) and were not qualified on this basis.

#### 6.0 ICP-AES Interference Check Sample -

The interference check sample (ICS) is analyzed by ICP-AES to verify interelement and background correction factors. Analysis is required at the beginning and end of each sample analysis run and recoveries must be between 80% and 120%. All ICS-AB recoveries associated with reported sample results were within the recovery criteria. The ICS-A recoveries for chromium were high, but no analytes that interfere with chromium were at interfering levels.

One of the samples had an interfering level of calcium. Since the estimated interference due to high calcium was negligible, no qualification was made based on suspected interference.

#### 7.0 Duplicate Analysis - Acceptable

Duplicate analysis was done on sample MJ0MJ4. Water duplicate results were within the  $\pm 20\%$  Relative Percent Difference (RPD) or  $\pm$ CRDL criteria for water results  $< 5$  times the CRDL criteria; therefore no qualification was made on this basis.

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## 8.0 Matrix Spike Analysis - Acceptable

Matrix spike sample analyses are done to provide information about the effect of the sample matrix on digestion and measurement methods. Matrix spike recovery must be within the limits of 75 - 125%. Matrix spike analysis was done on sample MJ0MJ1. All matrix spike recoveries were within the required QC limits, therefore no qualification was made based on matrix spike recovery.

## 9.0 ICP-AES Serial Dilution -

Sample MJ0MJ1 was analyzed by ICP-AES serial dilution to check for potential interferences. All of the analytes which exceeded the minimum concentration criterion (50 times the IDL) were within the 10%D criteria; with the exception of potassium (22%D). All potassium results were qualified 'J', estimated.

## 10.0 Detection Limits - Acceptable

Sample results which fall below the instrument detection limit (IDL) are assigned the value of the instrument detection limit and the 'U' qualifier is attached.

Contract Required Detection Limit (CRDL) standards are required for most analytes to demonstrate a linear calibration curve near the CRDL. CRDL standards were run at the required frequency. Data user note: results below the CRDL but above the IDL have a laboratory concentration qualifier of 'B' in the C column of the Form 1.

## 11.0 Overall Assessment of the Data

This validation of the data is based on the criteria outlined in the *National Functional Guidelines for Inorganic Data Review (02/94)*.

There were 299 data points reported: 37 results were qualified due to blank contamination and 13 results were qualified due to poor serial dilution results. Overall, 17 percent of the data was qualified.

Below are the definitions for the National Functional Guidelines for Inorganic Data Review (02/94) qualifiers used when validating/qualifying data from Inorganic analysis.

### DATA QUALIFIERS

- U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
- J - The associated value is an estimated quantity.



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- The data are unusable. (Note: Analyte may or may not be present.)
- UJ - The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.



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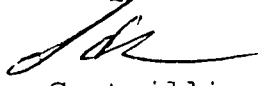
IN REPLY

REFER TO: OEA-095

October 15, 2002

MEMORANDUM

SUBJECT: Taylor Lumber and Treating, CLP Metals Analysis, Data  
Validation  
Case: 30869  
SDG: MJ0MQ3

FROM:   
Laura Castrilli, Chemist  
Quality Assurance, Monitoring & Assessment Unit, OEA

TO: Loren McPhillips, Remedial Project Manager  
Office of Environmental Cleanup

CC: Bruce Woods, Region 10 CLP TPO  
Trish Larson, CH2M HILL  
Scott Echols, CH2M HILL

The following is a validation of ICP-AES and mercury analyses of fourteen water samples from the Taylor Lumber and Treating site. The analyses were performed following the USEPA Contract Laboratory Program Statement of Work for Inorganics Analysis Multi-media, Multi-Concentration, ILM04.1. Analyses were conducted by Sentinel Inc., Huntsville, Alabama. This validation was conducted for the following samples:

|        |        |        |        |        |        |        |
|--------|--------|--------|--------|--------|--------|--------|
| MJ0MQ3 | MJ0MQ5 | MJ0MQ7 | MJ0MQ9 | MJ0MR1 | MJ0MR3 | MJ0MR5 |
| MJ0MQ4 | MJ0MQ6 | MJ0MQ8 | MJ0MR0 | MJ0MR2 | MJ0MR4 | MJ0MR6 |

**Data Qualifications**

The following comments refer to Sentinel's performance in meeting quality control specifications outlined in the *CLP Statement of Work (CLP-SOW) for Inorganic Analysis, rev. ILM04.1*. The comments presented herein are based on the information provided for the review.

**1.0 Timeliness - Acceptable**

The technical (40 CFR part 136) holding time from the date of collection for mercury in water is 28 days. The holding time for the remaining metals in water is 180 days. The samples were collected between 09/03/02 and 09/05/02. Mercury analyses were completed on 09/10/02. ICP-AES analyses were completed on 09/11/02. All analyses

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or more continuing calibration blanks (CCBs).

Based on blank contamination, the following qualifications were made:

- ♦ Aluminum in samples MJ0MQ3 through MJ0MQ6, MJ0MQ8, MJ0MR2, MJ0MR3, and MJ0MR6 was qualified 'U', undetected.
- ♦ Iron in samples MJ0MQ3 and MJ0MQ8 was qualified 'U', undetected.
- ♦ Thallium in sample MJ0MR5 was qualified 'U', undetected.

The remaining sample results were greater than five times the associated blank levels (or were already undetected) and were not qualified on this basis.

#### **6.0 ICP-AES Interference Check Sample - Acceptable**

The interference check sample (ICS) is analyzed by ICP-AES to verify interelement and background correction factors. Analysis is required at the beginning and end of each sample analysis run and recoveries must be between 80% and 120%. All ICS-AB recoveries associated with reported sample results were within the recovery criteria. The ICS-A recoveries for chromium were high, but no analytes that interfere with chromium were at interfering levels.

One of the samples had an interfering level of calcium. Since the estimated interference due to high calcium was negligible, no qualification was made based on suspected interference.

#### **7.0 Duplicate Analysis - Acceptable**

Duplicate analysis was done on sample MJ0MQ3. Water duplicate results were within the  $\pm 20\%$  Relative Percent Difference (RPD) or  $\pm$ CRDL criteria for water results  $< 5$  times the CRDL criteria; therefore no qualification was made on this basis.

#### **8.0 Matrix Spike Analysis - Acceptable**

Matrix spike sample analyses are done to provide information about the effect of the sample matrix on digestion and measurement methods. Matrix spike recovery must be within the limits of 75 - 125%.

Matrix spike analysis was done on sample MJ0MQ4. All matrix spike recoveries were within the required QC limits, therefore no qualification was made based on matrix spike recovery.

#### **9.0 ICP-AES Serial Dilution -**

Sample MJ0MQ3 was analyzed by ICP-AES serial dilution to check for potential interferences. All of the analytes which exceeded the

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were conducted within the technical water holding times, therefore no qualification was made based on holding time.

## 2.0 Sample Preparation - Acceptable

The samples were prepared for ICP-AES and mercury analyses on 09/10/02. No qualification was made based on sample preparation.

## 3.0 Calibrations/Calibration Verifications - Acceptable

The samples were analyzed for mercury by CVAAS on 09/10/02. The initial calibration included one blank and six standards. The curve was linear with a correlation coefficient greater than 0.995.

The samples were analyzed by ICP-AES on 09/11/02. The instrument was standardized each day of analysis according to the analytical method using one blank and one calibration standard for each element.

All ICP-AES and CVAAS (mercury) calibrations were performed as required and met the acceptance criteria; therefore, no qualification was made on this basis.

Calibration verification samples are required before and after sample analysis and after every 10 samples during analysis. Mercury recoveries must be within 80-120%. Other metal recoveries must be within 90-110%.

All ICP-AES and CVAAS (mercury) calibration verification (initial and continuing) samples bracketing reported sample results met the frequency and recovery criteria; therefore no qualification was made based on ICP-AES or CVAAS calibration verification.

## 4.0 Laboratory Control Samples - Acceptable

Laboratory Control samples (LCS) are digested and analyzed along with the samples to verify the efficiency of laboratory procedures. All recoveries associated with reported sample results met the acceptance criteria for control samples; therefore no qualification was made on this basis.

## 5.0 Blanks -

Procedural blanks were prepared with the samples to show potential contamination from the digestion or analytical procedure. If an analyte was found in the associated blank, the sample results were qualified if the analyte concentration was less than five times the analytical value in the blank.

Aluminum, iron, and thallium were detected in the preparation blank. Aluminum, barium, iron, thallium, and magnesium were detected in one

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minimum concentration criterion (50 times the IDL) were within the 10%D criteria; with the exception of sodium (13%D) and potassium (43%D). All sodium and potassium results were qualified 'J', estimated.

#### **10.0 Detection Limits - Acceptable**

Sample results which fall below the instrument detection limit (IDL) are assigned the value of the instrument detection limit and the 'U' qualifier is attached.

Contract Required Detection Limit (CRDL) standards are required for most analytes to demonstrate a linear calibration curve near the CRDL. CRDL standards were run at the required frequency. Data user note: results below the CRDL but above the IDL have a laboratory concentration qualifier of 'B' in the C column of the Form 1.

#### **11.0 Overall Assessment of the Data**

This validation of the data is based on the criteria outlined in the *National Functional Guidelines for Inorganic Data Review (02/94)*.

There were 322 data points reported: 11 results were qualified due to blank contamination and 28 results were qualified due to poor serial dilution results. Overall, 12 percent of the data was qualified.

Below are the definitions for the National Functional Guidelines for Inorganic Data Review (02/94) qualifiers used when validating/qualifying data from Inorganic analysis.

#### **DATA QUALIFIERS**

- U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
- J - The associated value is an estimated quantity.
- R - The data are unusable. (Note: Analyte may or may not be present.)
- UJ - The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 10

1200 Sixth Avenue  
Seattle, Washington 98101


IN REPLY

REFER TO: OEA-095

October 15, 2002

MEMORANDUM

SUBJECT: Taylor Lumber and Treating, CLP Metals Analysis, Data  
Validation  
Case: 30869  
SDG: MJ0MG9

FROM:   
Laura Castrilli, Chemist  
Quality Assurance, Monitoring & Assessment Unit, OEA

TO: Loren McPhillips, Remedial Project Manager  
Office of Environmental Cleanup

CC: Bruce Woods, Region 10 CLP TPO  
Trish Larson, CH2M HILL  
Scott Echols, CH2M HILL

The following is a validation of ICP-AES and mercury analyses of thirteen water samples from the Taylor Lumber and Treating site. The analyses were performed following the USEPA Contract Laboratory Program Statement of Work for Inorganics Analysis Multi-media, Multi-Concentration, ILM04.1. Analyses were conducted by Sentinel Inc., Huntsville, Alabama. This validation was conducted for the following samples:

|        |        |        |        |        |        |        |
|--------|--------|--------|--------|--------|--------|--------|
| MJ0MG9 | MJ0MH1 | MJ0MH3 | MJ0MH6 | MJ0MH8 | MJ0MJ0 | MJ0MJ3 |
| MJ0MH0 | MJ0MH2 | MJ0MH4 | MJ0MH7 | MJ0MH9 | MJ0MJ2 |        |

**Data Qualifications**

The following comments refer to Sentinel's performance in meeting quality control specifications outlined in the CLP Statement of Work (CLP-SOW) for Inorganic Analysis, rev. ILM04.1. The comments presented herein are based on the information provided for the review.

**1.0 Timeliness - Acceptable**

The technical (40 CFR part 136) holding time from the date of collection for mercury in water is 28 days. The holding time for the remaining metals in water is 180 days. The samples were collected between 08/21/02 and 08/27/02. Mercury analyses were completed on 09/04/02. ICP-AES analyses were completed on 09/03/02. All analyses



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were conducted within the technical water holding times, therefore no qualification was made based on holding time.

## **2.0 Sample Preparation - Acceptable**

The samples were prepared for ICP-AES and mercury analyses on 09/03/02. No qualification was made based on sample preparation.

## **3.0 Calibrations/Calibration Verifications - Acceptable**

The samples were analyzed for mercury by CVAAS on 09/04/02. The initial calibration included one blank and six standards. The curve was linear with a correlation coefficient greater than 0.995.

The samples were analyzed by ICP-AES on 09/03/02. The instrument was standardized each day of analysis according to the analytical method using one blank and one calibration standard for each element.

All ICP-AES and CVAAS (mercury) calibrations were performed as required and met the acceptance criteria; therefore, no qualification was made on this basis.

Calibration verification samples are required before and after sample analysis and after every 10 samples during analysis. Mercury recoveries must be within 80-120%. Other metal recoveries must be within 90-110%.

All ICP-AES and CVAAS (mercury) calibration verification (initial and continuing) samples bracketing reported sample results met the frequency and recovery criteria; therefore no qualification was made based on ICP-AES or CVAAS calibration verification.

## **4.0 Laboratory Control Samples - Acceptable**

Laboratory Control samples (LCS) are digested and analyzed along with the samples to verify the efficiency of laboratory procedures. All recoveries associated with reported sample results met the acceptance criteria for control samples; therefore no qualification was made on this basis.

## **5.0 Blanks -**

Procedural blanks were prepared with the samples to show potential contamination from the digestion or analytical procedure. If an analyte was found in the associated blank, the sample results were qualified if the analyte concentration was less than five times the analytical value in the blank.

Aluminum, iron, magnesium, and manganese in the preparation blank had negative results with absolute values greater than the instrumental

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Detection limit (IDL). Chromium and magnesium were detected in a continuing calibration blank (CCB). Aluminum, iron, magnesium, and manganese in one or more CCBs had negative results with absolute values greater than the IDLs.

Based on blank contamination, the following qualifications were made:

- ♦ Aluminum in all samples except MJ0MH2 was qualified 'J', estimated.
- ♦ Chromium in samples MJ0MH7, MJ0MJ0, and MJ0MJ2 was qualified 'U', undetected.
- ♦ Iron in samples MJ0MH0, MJ0MH3, MJ0MH7, and MJ0MJ2 was qualified 'J', estimated, or 'UJ', estimated detection limit.

The remaining sample results were greater than five times the associated blank levels (or were already undetected) and were not qualified on this basis.

#### 6.0 ICP-AES Interference Check Sample - Acceptable

The interference check sample (ICS) is analyzed by ICP-AES to verify interelement and background correction factors. Analysis is required at the beginning and end of each sample analysis run and recoveries must be between 80% and 120%. All ICS-AB recoveries associated with reported sample results were within the recovery criteria. The ICS-A recoveries for chromium were high, but no analytes that interfere with chromium were at interfering levels.

None of the samples had interfering levels of elements; therefore no qualification was made based on suspected interference.

#### 7.0 Duplicate Analysis - Acceptable

Duplicate analysis was done on sample MJ0MH6. Water duplicate results were within the  $\pm 20\%$  Relative Percent Difference (RPD) or  $\pm$ CRDL criteria for water results  $< 5$  times the CRDL criteria; therefore no qualification was made on this basis.

#### 8.0 Matrix Spike Analysis - Acceptable

Matrix spike sample analyses are done to provide information about the effect of the sample matrix on digestion and measurement methods. Matrix spike recovery must be within the limits of 75 - 125%.

Matrix spike analysis was done on sample MJ0MH4. All matrix spike recoveries were within the required QC limits, therefore no qualification was made based on matrix spike recovery.



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## 9.0 ICP-AES Serial Dilution -

Sample MJ0MH4 was analyzed by ICP-AES serial dilution to check for potential interferences. All of the analytes which exceeded the minimum concentration criterion (50 times the IDL) were within the 10%D criteria; with the exception of iron (28%D) and potassium (61%D). All iron and potassium results were qualified 'J', estimated.

## 10.0 Detection Limits - Acceptable

Sample results which fall below the instrument detection limit (IDL) are assigned the value of the instrument detection limit and the 'U' qualifier is attached.

Contract Required Detection Limit (CRDL) standards are required for most analytes to demonstrate a linear calibration curve near the CRDL. CRDL standards were run at the required frequency. Data user note: results below the CRDL but above the IDL have a laboratory concentration qualifier of 'B' in the C column of the Form 1.

## 11.0 Overall Assessment of the Data

This validation of the data is based on the criteria outlined in the *National Functional Guidelines for Inorganic Data Review (02/94)*.

There were 299 data points reported: 19 results were qualified due to blank contamination and 26 results were qualified due to poor serial dilution results. Overall, 14 percent of the data was qualified (only counting one qualification per analyte).

Below are the definitions for the *National Functional Guidelines for Inorganic Data Review (02/94)* qualifiers used when validating/qualifying data from Inorganic analysis:

### DATA QUALIFIERS

- U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
- J - The associated value is an estimated quantity.
- R - The data are unusable. (Note: Analyte may or may not be present.)
- UJ - The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.



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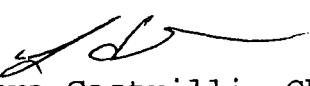
REFER TO: OEA-095

January 28, 2003

Environmental Cleanup Office

MEMORANDUM

SUBJECT: Taylor Lumber and Treating, CLP Metals Analysis, Data  
Validation  
Case: 31270  
SDG: MJ0MG9

FROM:   
Laura Castrilli, Chemist  
Quality Assurance, Monitoring & Assessment Unit, OEA

TO: Loren McPhillips, Remedial Project Manager  
Office of Environmental Cleanup

CC: Bruce Woods, Region 10 CLP TPO  
Trish Larson, CH2M HILL  
Scott Echols, CH2M HILL

The following is a validation of ICP-MS analyses (arsenic, lead, selenium and thallium only) of nineteen water samples from the Taylor Lumber and Treating site. The analyses were performed following the USEPA Contract Laboratory Program Statement of Work for Inorganics Analysis Multi-media, Multi-Concentration, ILM05.2. Analyses were conducted by Sentinel Inc., Huntsville, Alabama. These analyses were scheduled on 12/09/02. Sentinel had previously received/analyzed the samples for ICP-AES metals and mercury under Case 30869 (ILM04.1). This ICP-MS validation was conducted for the following samples:

|        |        |        |        |        |        |        |
|--------|--------|--------|--------|--------|--------|--------|
| MJ0MG9 | MJ0MH2 | MJ0MH7 | MJ0MJ0 | MJ0MJ3 | MJ0MJ7 | MJ0MK0 |
| MJ0MH0 | MJ0MH3 | MJ0MH8 | MJ0MJ1 | MJ0MJ5 | MJ0MJ8 |        |
| MJ0MH1 | MJ0MH4 | MJ0MH9 | MJ0MJ2 | MJ0MJ6 | MJ0MJ9 |        |

**Data Qualifications**

The following comments refer to Sentinel's performance in meeting quality control specifications outlined in the CLP Statement of Work (CLP-SOW) for Inorganic Analysis, rev. ILM05.2 and the Functional Guidelines for Inorganic Data Review (July 2002); utilizing professional judgement of the reviewer. The comments presented herein are based on the information provided for the review.

1.0 **Timeliness** - Acceptable

The technical (40 CFR part 136) holding time from the date of

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collection for metals in water is 180 days. The samples were collected between 08/21/02 and 08/27/02. ICP-MS analyses were completed on 12/20/02. All analyses were conducted within the technical water holding times, therefore no qualification was made based on holding time.

## 2.0 Sample Preparation - Acceptable

The samples were prepared for ICP-MS analyses on 12/11/02. Due to the low volume remaining for analyses, reduced sample volumes of 40-50 mL was used. No qualification was made based on sample preparation.

## 3.0 ICP-MS Tune -

Prior to instrument calibrations, the tuning solution was analyzed the minimal 5 times. The mass calibrations were within 0.1 amu for each isotope in the tuning solution.

However, the peak width at 5% peak height exceeded the <0.75 functional guideline criteria for <sup>9</sup>Be (0.77\*), <sup>59</sup>Co (0.77\*), <sup>113</sup>In (0.82\*), <sup>115</sup>In (0.76\*), <sup>206</sup>Pb (0.76\*), <sup>207</sup>Pb (0.76\*), and <sup>208</sup>Pb (0.76\*). In the professional judgement of EPA QA chemists, it was decided to use an upper limit of 0.825 for the peak width criteria. Since all of the peak widths were within this expanded criteria, no qualification was made based on the average peak width at 5% peak height. \*For both dates of ICP-MS analysis.

The %Relative Standard Deviation (RSD) for each tune mass were all within the 5% acceptance criteria. This was confirmed by checking the raw uncorrected ICP-MS per mass data that was provided in addition to the corrected concentration data.

It was not possible to verify the measured mass and average peak widths reported on Form 14 (ICP-MS). The laboratory was contacted for further information. In a January 17, 2003 memorandum, the laboratory indicated that raw tune data is not available in a hard copy format (i.e. the information must manually be transcribed directly from the computer screen to complete the form). The laboratory's TPO was notified and the lab will be referred to an instrument software patch that will enable them to provide this information for future data packages. Since the rest of the quality control data was within criteria for lab control samples, internal standards, duplicate, matrix spike, serial dilution etc., no qualification was made based on the missing raw data.

## 4.0 Calibrations/Calibration Verifications - Acceptable

The samples were analyzed for arsenic, lead, selenium, and thallium by ICP-MS on 12/17/02 and 12/20/02.

The instrument was standardized each day of analysis according to the analytical method using one blank and one calibration standard for

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each element after tuning the instrument.

All ICP-MS calibrations were performed as required and met the acceptance criteria; therefore, no qualification was made on this basis.

Calibration verification samples are required before and after sample analysis and after every 10 samples during analysis. Recoveries must be within 90-110%.

All ICP-MS calibration verification (initial and continuing) samples bracketing reported sample results met the frequency and recovery criteria; therefore no qualification was made based on ICP-MS calibration verification.

#### 4.0 Blanks -

Procedural blanks were prepared with the samples to show potential contamination from the digestion or analytical procedure. If an analyte was found in the associated blank, the sample results were qualified if the analyte concentration was less than five times the analytical value in the blank.

Lead in all of the 12/17/02 continuing calibration blanks (CCBs) had negative results with absolute values greater than the method detection limits (MDLs). Arsenic in one 12/17/02 CCB had a negative result with an absolute value greater than the MDL. Thallium was detected in one 12/20/02 CCB.

Based on blank contamination, the following qualifications were made:

- ♦ Arsenic results for samples MJ0MH7 and MJ0MH8 were qualified 'J', estimated, or 'UJ', estimated detection limit. Arsenic results on the Form I's for samples MJ0MH2 and MJ0MH3 were reported as detects. However, the raw sample results were below the arsenic MDL; therefore arsenic in samples MJ0MH2 and MJ0MH3 was qualified 'UJ', estimated detection limit.
- ♦ Lead results for samples MJ0MG9, MJ0MH0 through MJ0MH4, and MJ0MH7 through MJ0MH9 were qualified 'J', estimated, or 'UJ', estimated detection limit.

The remaining sample results were greater than five times the associated blank levels (or were already not detected) and were not qualified on this basis.

#### 5.0 ICP-MS Interference Check Sample -

The interference check sample (ICS) is analyzed by ICP-MS to verify interelement and background correction factors. Analysis is required at the beginning and end of each sample analysis run and recoveries must be between 80% and 120%. All ICS-AB recoveries for reported

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analytes were within the recovery criteria. The ICS-A and ICS-AB recoveries for the interferents - aluminum, calcium, iron, and magnesium were acceptable. Note that it appears incorrect ICS-A and ICS-AB true values for aluminum are reported on the ICS forms. Since aluminum is not a reported analyte, no action was taken.

There were some high calcium levels, however, the target analytes were either, not detected in more than 1 of the two ICS-A analyses for each day or if present in the ICS-A, the recoveries were between 80-120%. No qualification was made based on ICS results/suspected interference.

#### 6.0 Laboratory Control Samples - Acceptable

Laboratory Control samples (LCS) are digested and analyzed along with the samples to verify the efficiency of laboratory procedures. All recoveries associated with reported sample results met the acceptance criteria for control samples; therefore no qualification was made on this basis.

#### 7.0 Duplicate Analysis - Acceptable

Duplicate analysis was done on sample MJ0MG9. Water duplicate results were within the  $\pm 20\%$  Relative Percent Difference (RPD) or  $\pm$ CRQL criteria for water results < 5 times the CRQL criteria; therefore no qualification was made on this basis.

#### 8.0 Matrix Spike Analysis - Acceptable

Matrix spike sample analyses are done to provide information about the effect of the sample matrix on digestion and measurement methods. Matrix spike recovery must be within the limits of 75 - 125%.

Matrix spike analysis was done on sample MJ0MH4. All matrix spike recoveries were within the required QC limits, therefore no qualification was made based on matrix spike recovery.

#### 9.0 ICP-MS Serial Dilution - Acceptable

Sample MJ0MH4 was analyzed by ICP-MS serial dilution to check for potential interferences. All of the analytes which exceeded the minimum concentration criterion (50 times the MDL) were within the 10%D criteria; therefore no qualification was made based on serial dilution.

#### 10.0 ICP-MS Internal Standards -

The laboratory added 6 internal standards to each sample, blank, QC sample etc. A minimum of 3 is required, however, the three chosen are supposed to bracket the masses of the reported analytes, which they did for this SDG.

The relative (to the internal standard response in the calibration

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blank) percent recoveries for the internal standards were all within the 60-125% acceptance criteria for reported sample results. The last CCV and/or CCB associated with reported sample results from each day's analysis had high %RI's for In, Tb and/or Bi. Since samples were run before the high %RI's for the CCBs/CCVs and since the samples had acceptable internal standard %RI's, no qualification was made based on internal standards.

#### 11.0 Detection Limits - Acceptable

Sample results which fall below the method detection limit (MDL) are assigned the value of the CRQL and the 'U' qualifier is attached. This is a major difference from past SOWs where non detects were reported down to the instrumental detection limit. For data users' convenience, the MDLs for this SDG have been attached.

Contract Required Quantitation Limit (CRQL) standards are required for most analytes to demonstrate a linear calibration curve near the CRQL. CRQL standards were run at the required frequency. The new SOW requires that CRQL standards be re-analyzed if the recovery criteria have not been met and if they are still not met, the instrument has to be re-calibrated and affected samples/analytes have to be re-analyzed. All CRQL results were within the general 70-130% recovery criteria.

#### 12.0 Overall Assessment of the Data

For ILM05.2, the laboratory is required to flag all detected results below the CRQL with a 'J' concentration qualifier (result below the CRQL but above the MDL).

Also new with ILM05.2, a laboratory 'D' qualifier in the qualification column indicates that a result is reported from a dilution analysis.

Electronic data users should note that there were some inexplicable differences between CADRE qualified results and the Form I's. The hard copy Form I's should be used as differences between the raw data and Form I's were not encountered.

There were 76 data points reported: 11 results were qualified due to blank contamination. Overall, 14 percent of the data was qualified.

Below are the definitions for the National Functional Guidelines for Inorganic Data Review (07/02) qualifiers used when validating/qualifying data from Inorganic analysis.

#### DATA QUALIFIERS

- U - The material was analyzed for, but was not detected above the level of the reported sample quantitation limit.
- J - The result is an estimated quantity. The associated numerical value is the approximate concentration of the

*January 28, 2003*

analyte in the sample.

- J+ - The result is an estimated quantity, but the result may be biased high.
- J- - The result is an estimated quantity, but the result may be biased low.
- R - The data are unusable. The sample results are rejected due to serious deficiencies in meeting QC criteria. The analyte may or may not be present in the sample.
- UJ - The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.



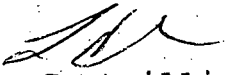
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 10  
1200 Sixth Avenue  
Seattle, Washington 98101

IN REPLY

REFER TO: OEA-095 January 23, 2003 - Revised memo

MEMORANDUM

SUBJECT: Taylor Lumber and Treating, CLP Metals Analysis, Data  
Validation  
Case: 31270  
SDG: MJ0MP8

FROM:  Laura Castrilli, Chemist  
Quality Assurance, Monitoring & Assessment Unit, OEA

TO: Loren McPhillips, Remedial Project Manager  
Office of Environmental Cleanup

CC: Bruce Woods, Region 10 CLP TPO  
Trish Larson, CH2M HILL  
Scott Echols, CH2M HILL

Please disregard the earlier revision (also dated January 23, 2003) of this memo. The replacement memo has 'revised memo' in the header.

The following is a validation of ICP-MS analyses (arsenic, lead, selenium and thallium only) of nineteen water samples from the Taylor Lumber and Treating site. The analyses were performed following the USEPA Contract Laboratory Program Statement of Work for Inorganics Analysis Multi-media, Multi-Concentration, ILM05.2. Analyses were conducted by Sentinel Inc., Huntsville, Alabama. These analyses were scheduled on 12/09/02. Sentinel had previously received/analyzed the samples for ICP-AES metals and mercury under Case 30869 (ILM04.1). This ICP-MS validation was conducted for the following samples:

|        |        |        |        |        |        |        |
|--------|--------|--------|--------|--------|--------|--------|
| MJ0MP8 | MJ0MQ1 | MJ0MQ4 | MJ0MQ7 | MJ0MR0 | MJ0MR3 | MJ0MR6 |
| MJ0MP9 | MJ0MQ2 | MJ0MQ5 | MJ0MQ8 | MJ0MR1 | MJ0MR4 |        |
| MJ0MQ0 | MJ0MQ3 | MJ0MQ6 | MJ0MQ9 | MJ0MR2 | MJ0MR5 |        |

**Data Qualifications**

The following comments refer to Sentinel's performance in meeting quality control specifications outlined in the CLP Statement of Work (CLP-SOW) for Inorganic Analysis, rev. ILM05.2 and the Functional Guidelines for Inorganic Data Review (July 2002); utilizing professional judgement of the reviewer. The comments presented herein are based on the information provided for the review.



January 23, 2003 - Revised memo

#### 1.0 Timeliness - Acceptable

The technical (40 CFR part 136) holding time from the date of collection for metals in water is 180 days. The samples were collected between 08/21/02 and 09/05/02. ICP-MS analyses were completed on 12/17/02. All analyses were conducted within the technical water holding times, therefore no qualification was made based on holding time.

#### 2.0 Sample Preparation - Acceptable

The samples were prepared for ICP-MS analyses on 12/11/02. Due to the low volume remaining for analyses, a reduced sample volume of 25 mL was used. No qualification was made based on sample preparation.

#### 3.0 ICP-MS Tune -

Prior to instrument calibration, the tuning solution was analyzed the minimal 5 times. The mass calibration was within 0.1 amu for each isotope in the tuning solution.

However, the peak width at 5% peak height exceeded the <0.75 functional guideline criteria for <sup>9</sup>Be (0.77), <sup>59</sup>Co (0.77), <sup>113</sup>In (0.82), <sup>115</sup>In (0.76), <sup>206</sup>Pb (0.76), <sup>207</sup>Pb (0.76), and <sup>208</sup>Pb (0.76). In the professional judgement of EPA QA chemists, it was decided to use an upper limit of 0.825 for the peak width criteria. Since all of the peak widths were within this expanded criteria, no qualification was made based on the average peak width at 5% peak height.

The %Relative Standard Deviation (RSD) for each tune mass were all within the 5% acceptance criteria. This was confirmed by checking the raw uncorrected ICP-MS per mass data that was provided in addition to the corrected concentration data.

It was not possible to verify the measured mass and average peak widths reported on Form 14 (ICP-MS). The laboratory was contacted for further information. In a January 17, 2003 memorandum, the laboratory indicated that raw tune data is not available in a hard copy format (i.e. the information must manually be transcribed directly from the computer screen to complete the form). The laboratory's TPO was notified and the lab will be referred to an instrument software patch that will enable them to provide this information for future data packages. Since the rest of the quality control data was within criteria for lab control samples, internal standards, duplicate, matrix spike, serial dilution etc., no qualification was made based on the missing raw data.

#### 4.0 Calibrations/Calibration Verifications - Acceptable

The samples were analyzed for arsenic, lead, selenium, and thallium by ICP-MS on 12/17/02.

The instrument was standardized each day of analysis according to the

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analytical method using one blank and one calibration standard for each element after tuning the instrument.

All ICP-MS calibrations were performed as required and met the acceptance criteria; therefore, no qualification was made on this basis.

Calibration verification samples are required before and after sample analysis and after every 10 samples during analysis. Recoveries must be within 90-110%.

All ICP-MS calibration verification (initial and continuing) samples bracketing reported sample results met the frequency and recovery criteria; therefore no qualification was made based on ICP-MS calibration verification.

#### 4.0 Blanks -

Procedural blanks were prepared with the samples to show potential contamination from the digestion or analytical procedure. If an analyte was found in the associated blank, the sample results were qualified if the analyte concentration was less than five times the analytical value in the blank.

Lead in all of the continuing calibration blanks (CCBs) had negative results with absolute values greater than the method detection limits (MDLs).

Based on blank contamination, all lead results except for samples MJ0MQ7 and MJ0MR1, were qualified 'J', estimated, or 'UJ', estimated detection limit.

The remaining sample results were greater than five times the associated blank levels and were not qualified on this basis.

#### 5.0 ICP-MS Interference Check Sample -

The interference check sample (ICS) is analyzed by ICP-MS to verify interelement and background correction factors. Analysis is required at the beginning and end of each sample analysis run and recoveries must be between 80% and 120%. All ICS-AB recoveries for reported analytes were within the recovery criteria. The ICS-A and ICS-AB recoveries for the interferents - aluminum, calcium, iron, and magnesium were lower than 80%. This may be due to ICP-MS linear range limitations (since these aren't target analytes, MDLs and linear range information was not provided).

There were some high calcium levels, however, the target analytes were either, not detected in 2 or more of the three ICS-A analyses or if present in the ICS-A, the recoveries were between 80-120%. No qualification was made based on ICS results/suspected interference.

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#### 6.0 Laboratory Control Samples - Acceptable

Laboratory Control samples (LCS) are digested and analyzed along with the samples to verify the efficiency of laboratory procedures. All recoveries associated with reported sample results met the acceptance criteria for control samples; therefore no qualification was made on this basis.

#### 7.0 Duplicate Analysis - Acceptable

Duplicate analysis was done on sample MJ0MR1. Water duplicate results were within the  $\pm 20\%$  Relative Percent Difference (RPD) or  $\pm$ CRQL criteria for water results < 5 times the CRQL criteria; therefore no qualification was made on this basis.

#### 8.0 Matrix Spike Analysis - Acceptable

Matrix spike sample analyses are done to provide information about the effect of the sample matrix on digestion and measurement methods. Matrix spike recovery must be within the limits of 75 - 125%.

Matrix spike analysis was done on sample MJ0MR1. All matrix spike recoveries were within the required QC limits, therefore no qualification was made based on matrix spike recovery.

#### 9.0 ICP-MS Serial Dilution - Acceptable

Sample MJ0MR1 was analyzed by ICP-MS serial dilution to check for potential interferences. All of the analytes which exceeded the minimum concentration criterion (50 times the MDL) were within the 10%D criteria; therefore no qualification was made based on serial dilution.

#### 10.0 ICP-MS Internal Standards -

The laboratory added 6 internal standards to each sample, blank, QC sample etc. A minimum of 3 is required, however, the three chosen are supposed to bracket the masses of the reported analytes, which they did for this SDG.

The relative (to the internal standard response in the calibration blank) percent recoveries for the internal standards were all within the 60-125% acceptance criteria; therefore no qualification was made based on internal standards.

#### 11.0 Detection Limits - Acceptable

Sample results which fall below the method detection limit (MDL) are assigned the value of the CRQL and the 'U' qualifier is attached. This is a major difference from past SOWs where non detects were reported down to the instrumental detection limit. For data users' convenience, the MDLs for this SDG have been attached.

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Contract Required Quantitation Limit (CRQL) standards are required for most analytes to demonstrate a linear calibration curve near the CRQL. CRQL standards were run at the required frequency. The new SOW requires that CRQL standards be re-analyzed if the recovery criteria have not been met and if they are still not met, the instrument has to be re-calibrated and affected samples/analytes have to be re-analyzed. All CRQL results were within the general 70-130% recovery criteria.

## 12.0 Overall Assessment of the Data

For ILM05.2, the laboratory is required to flag all detected results below the CRQL with a 'J' concentration qualifier (result below the CRQL but above the MDL).

Also new with ILM05.2, a laboratory 'D' qualifier in the qualification column indicates that a result is reported from a dilution analysis.

There were 76 data points reported: 17 results were qualified due to blank contamination. Overall, 22 percent of the data was qualified.

Below are the definitions for the National Functional Guidelines for Inorganic Data Review (07/02) qualifiers used when validating/qualifying data from Inorganic analysis.

### DATA QUALIFIERS

- U - The material was analyzed for, but was not detected above the level of the reported sample quantitation limit.
- J - The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
- J+ - The result is an estimated quantity, but the result may be biased high.
- J- - The result is an estimated quantity, but the result may be biased low.
- R - The data are unusable. The sample results are rejected due to serious deficiencies in meeting QC criteria. The analyte may or may not be present in the sample.
- UJ - The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.




UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 10  
1200 Sixth Avenue  
Seattle, WA 98101

November 5, 2002

**MEMORANDUM**

SUBJECT: Data validation report for the semi-volatile organic compound (SVOC) analysis of samples from the Taylor Lumber and Treating Co. site.

Case: 30869 SDG: J0M08

FROM: Chris Pace, QA Chemist, OEA 

TO: Loren McPhillips, RPM, ECL

CC: Bruce Woods, CLP PO, OEA  
Scott Echols, CH2M HILL

The quality assurance (QA) review of eleven water samples collected from the above referenced site has been completed. All samples were analyzed for SVOCs in accordance with the USEPA Contract Laboratory Program (CLP) Statement of Work (SOW) for Low Concentration Organic Analysis (OLC03.2) by MITKEM Corp. of Warwick, RI.

The following sample numbers were validated in this report:

|       |       |       |       |       |
|-------|-------|-------|-------|-------|
| J0M08 | J0M09 | J0M10 | J0M12 | J0M13 |
| J0M14 | J0M15 | J0M16 | J0M17 | J0M18 |
| J0M20 |       |       |       |       |

**DATA QUALIFICATIONS**

The following comments refer to the laboratory performance in meeting the Quality Control (QC) Specifications outlined in the USEPA CLP SOW for Low Concentration Organic Analysis (OLC03.2) and the USEPA CLP National Functional Guidelines for Low Concentration Organic Data Review (6/01).

The conclusions presented herein are based on the information provided for the review.

**Holding Time/Preservation - Acceptable**

The samples were collected between 8/26 and 9/3/02, extracted on 8/30 and 9/5/02 and analyzed between 9/4 and 9/10/02. All of the samples met the technical and SOW specified holding times and were properly preserved.

**Instrument Performance Check - Acceptable**

All of the GC/MS instrument performance checks met the ion abundance criteria. All of the samples were analyzed within an acceptable 12-hour QC period. The instruments used remained stable throughout the course of analyses.

**Initial Calibrations (ICAL) - Acceptable**

One SVOC initial calibrations were performed. The initial calibrations met the technical acceptance criteria for the percent relative standard deviations (%RSDs) and the relative response factors (RRFs) for all target compounds and deuterated monitoring compounds (DMCs).

**Continuing Calibration Verification (CCV)**

All of the SVOC CCV checks met the criteria for frequency of analysis, minimum RRFs and %Ds as compared to the initial calibration with the following exceptions:

- The %Ds and RRFs for the following SVOC compounds exceeded the QC limits (only those compounds that resulted in sample data qualification are listed).

| Date/Time of Analysis   | Compound   | %D/RRF            | Qualifier<br>Detect/Non-detect | Associated<br>Samples |
|-------------------------|--|-------------------|--------------------------------|-----------------------|
| 9/5/02<br>(1133)<br>S3  | N-nitroso-di-n-propylamine   | -30               | J/UJ                           | J0M08, J0M10, J0M12   |
| 9/7/02<br>(2135)<br>S3  | atrazine   | -27               | J/UJ                           | J0M09, J0M17          |
| 9/10/02<br>(1344)<br>S3 | bis(2-chloroethyl)ether<br>2,2-oxybis(1-chloropropane)<br>N-nitroso-di-n-propylamine | -27<br>-51<br>-32 | J/UJ<br>J/UJ<br>J/UJ           | J0M09DL, J0M12DL      |

**Quantitation Limits - Acceptable**

The quantitation limits (QLs) were based on the lowest standard concentration analyzed in the initial calibrations. Target compounds that were detected at concentrations less than the contract required quantitation limits (CRQLs) were qualified as estimated, "J". Detected compounds at concentrations over the calibration range were qualified as estimated, "J". All of the reported results were adjusted for sample amounts analyzed. The "E" and the "D" qualifiers applied by the laboratory were crossed out by the reviewer.

It is recommended that data users should utilize the results selected by the reviewer where more than one analysis was performed on a single sample or extract (i.e., dilution, re-analysis).

**Blanks**

All blanks for SVOC analysis were acceptable with the following exceptions:

| Blank  | Contaminant                | Associated Samples                |
|--------|----------------------------|-----------------------------------|
| SBLK3Y | bis(2-ethylhexyl)phthalate | J0M14, J0M15, J0M16, J0M17, J0M18 |

Bis(2-ethylhexyl)phthalate detected in the samples at concentrations less than ten times the value in their associated blank(s) were qualified as non-detects, "U".

**Analytical Sequence - Acceptable**

All of the standards, blanks, samples, and QC samples were analyzed in accordance with the SOW specified analytical sequence.

**Deuterated Monitoring Compounds (DMCs) - Acceptable**

All of the SVOC DMC recoveries met the applicable QC criteria with the following exceptions:

All samples except J0M09, J0M12 and J0M20 had high recoveries for 4-chloroaniline-d4. Target compounds associated with 4-chloroaniline-d4 were not detected in the samples and therefore, none of the data were qualified on this basis.

Sample J0M20 had a slightly low recovery for benzo(a)pyrene-d12. None of the data were qualified on this basis.

### **Matrix Spike/Matrix Spike Duplicate (MS/MSD) - Acceptable**

SVOC sample J0M08 was utilized for MS/MSD analyses. The criteria for frequency of analysis, recoveries and relative percent differences (RPDs) were met with the following exceptions:

J0M22MS had a slightly high recovery for 2,4-dinitrotoluene. None of the data were qualified on this basis.

### **Internal Standards - Acceptable**

The acceptance criteria for internal standards (IS) are  $\pm 20$  seconds for retention time (RT) shifts and -50% to +100% of the IS area as compared to the IS RT and area of the daily continuing calibration standard. All of the GC/MS analyses met the IS area and RT shift criteria.

### **Compound Identification - Acceptable**

All of the compounds detected in the GC/MS analyses were within the retention time windows, met the USEPA spectral matching criteria and were judged to be acceptable.

### **Tentatively Identified Compounds**

Peaks that were detected in the samples at areas  $>10\%$  of the internal standards and were not part of the target compound lists were identified as tentatively identified compounds (TICs). TICs that were both found in the sample and in the associated method blank(s) were qualified as unusable, "R." Peaks that were identified as common laboratory contaminants, solvent preservatives, column bleed or aldol condensation products were qualified as unusable, "R". The rest of the peaks identified as TICs were qualified "NJ", tentatively identified at an estimated concentration.



## Laboratory Contact

The laboratory was contacted for the following reasons:

The SVOC CCV performed on 9/10/02 at 13:44 on instrument S3 has the incorrect compound selected for atrazine. Fragment ions from pentachlorophenol appear to have been selected as atrazine. Atrazine and pentachlorophenol do not co-elute but are shown with the same retention time on page 308. The effected samples were J0M09DL and J0M12DL.

The laboratory has resubmitted the associated forms and raw data by fax. Resubmitted hard copies and diskset deliverable had not been received at the time of this report.

## Overall Assessment

The total number of data points was 845. Thirty eight (4.5%) were qualified as estimated due values reported below the CRQL, values reported above the calibration range and calibrations. Six (0.7%) were qualified as non-detected due to blank contamination.

All of the samples were analyzed in accordance with technical specifications outlined in the SOW. The data, as qualified, are acceptable and can be used for all purposes.

| Data Qualifiers |  |
|-----------------|--|
| U               | The analyte was not detected at or above the reported result.  |
| J               | The analyte was positively identified. The associated numerical result is an estimate.   |
| UJ              | The analyte was not detected at or above the reported estimated result. The associated numerical value is an estimate of the quantitation limit of the analyte in this sample. |
| R               | The data are unusable for all purposes.  |
| N               | There is evidence the analyte is present in this sample.   |
| JN              | There is evidence that the analyte is present. The associated numerical result is an estimate.   |



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**REGION 10**  
1200 Sixth Avenue  
Seattle, WA 98101

November 5, 2002

**MEMORANDUM**

**SUBJECT:** Data validation report for the semi-volatile organic compound (SVOC) analysis of samples from the Taylor Lumber and Treating Co. site.  
Case: 30869 SDG: J0M22

**FROM:** Chris Pace, QA Chemist, OEA

**TO:** Loren McPhillips, RPM, ECL

**CC:** Bruce Woods, CLP PO, OEA  
Scott Echols, CH2M HILL

The quality assurance (QA) review of eight water samples collected from the above referenced site has been completed. All samples were analyzed for SVOCs in accordance with the USEPA Contract Laboratory Program (CLP) Statement of Work (SOW) for Low Concentration Organic Analysis (OLC03.2) by MITKEM Corp. of Warwick, RI.

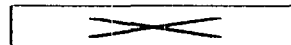
The following sample numbers were validated in this report:

J0M22 J0M23 J0M25 J0M26 J0M27  
J0M28 J0M29 J0M30

**DATA QUALIFICATIONS**

The following comments refer to the laboratory performance in meeting the Quality Control (QC) Specifications outlined in the USEPA CLP SOW for Low Concentration Organic Analysis (OLC03.2) and the USEPA CLP National Functional Guidelines for Low Concentration Organic Data Review (6/01).

The conclusions presented herein are based on the information provided for the review.



### **Holding Time/Preservation - Acceptable**

The samples were collected on 9/4 and 9/5/02, extracted on 9/6/02 and analyzed on 9/10 and 9/11/02. All of the samples met the technical and SOW specified holding times and were properly preserved.

### **Instrument Performance Check - Acceptable**

All of the GC/MS instrument performance checks met the ion abundance criteria. All of the samples were analyzed within an acceptable 12-hour QC period. The instruments used remained stable throughout the course of analyses.

### **Initial Calibrations (ICAL) - Acceptable**

One SVOC initial calibrations were performed. The initial calibrations met the technical acceptance criteria for the percent relative standard deviations (%RSDs) and the relative response factors (RRFs) for all target compounds and deuterated monitoring compounds (DMCs).

### **Continuing Calibration Verification (CCV)**

All of the SVOC CCV checks met the criteria for frequency of analysis, minimum RRFs and %Ds as compared to the initial calibration with the following exceptions:

- X The %Ds and RRFs for the following SVOC compounds exceeded the QC limits (only those compounds that resulted in sample data qualification are listed).

| Date/Time of Analysis   | Compound   | %D/RRF                  | Qualifier Detect/Non-detect    | Associated Samples                              |
|-------------------------|--|-------------------------|--------------------------------|---|
| 9/10/02<br>(1344)<br>S3 | bis(2-chloroethyl)ether<br>2,2-oxybis(1-chloropropane)<br>N-nitroso-di-n-propylamine | -27<br>-51<br>-32       | J/UJ<br>J/UJ<br>J/UJ           | J0M23, J0M25, J0M26DL,<br>J0M27DL, J0M28, J0M29 |
| 9/10/02<br>(2349)<br>S3 | 2,4,5-trichlorophenol<br>3-nitroaniline<br>4-nitroaniline<br>atrazine                | 33<br>-78<br>-51<br>-50 | J/none<br>J/UJ<br>J/UJ<br>J/UJ | J0M22, J0M26, J0M27, J0M30                      |
| 9/11/02<br>(1216)<br>S3 | 2,2-oxybis(1-chloropropane)<br>N-nitroso-di-n-propylamine                            | -52<br>-34              | J/UJ<br>J/UJ                   | J0M22DL, J0M23DL,<br>J0M25DL, J0M30DL           |

### **Quantitation Limits - Acceptable**

Samples J0M23 and J0M25 were analyzed at dilutions due to high analyte concentration and/or matrix interferences resulting in elevated quantitation limits (QLs).

The QLs were based on the lowest standard concentration analyzed in the initial calibrations. Target compounds that were detected at concentrations less than the contract required quantitation limits (CRQLs) were qualified as estimated, "J". Detected compounds at concentrations over the calibration range were qualified as estimated, "J". All of the reported results were adjusted for sample amounts analyzed. The "E" and the "D" qualifiers applied by the laboratory were crossed out by the reviewer.

It is recommended that data users should utilize the results selected by the reviewer where more than one analysis was performed on a single sample or extract (i.e., dilution, re-analysis).

### **Blanks - Acceptable**

All blanks for SVOC analysis were acceptable.

### **Analytical Sequence - Acceptable**

All of the standards, blanks, samples, and QC samples were analyzed in accordance with the SOW specified analytical sequence.

### **Deuterated Monitoring Compounds (DMCs)**

All of the SVOC DMC recoveries met the applicable QC criteria with the following exceptions:

DMC recoveries for samples J0M23 and J0M25 were diluted out. None of the data were qualified on this basis.

Sample J0M26 had a low recovery for benzo(a)pyrene-d12. Associated sample results were qualified as estimated, "J/UJ".

Sample J0M27 had a high recovery for 4-chloroaniline-d4. There were no associated detected results and therefore, none of the data were qualified on this basis.

Sample J0M28 had a slightly low recovery for benzo(a)pyrene-d12. None of the data were qualified on this basis.

### **Matrix Spike/Matrix Spike Duplicate (MS/MSD) - Acceptable**

SVOC sample J0M22 was utilized for MS/MSD analyses. The criteria for frequency of analysis, recoveries and relative percent differences (RPDs) were met with the following exceptions:

J0M22MS/MSD had slightly high recoveries for 2,4-dinitrotoluene. None of the data were qualified on this basis.

The recoveries for pentachlorophenol in samples J0M22MS/MSD could not be determined accurately due to the high concentration of pentachlorophenol native to the sample. None of the data were qualified on this basis.

### **Internal Standards - Acceptable**

The acceptance criteria for internal standards (IS) are  $\pm 20$  seconds for retention time (RT) shifts and -50% to +100% of the IS area as compared to the IS RT and area of the daily continuing calibration standard. All of the GC/MS analyses met the IS area and RT shift criteria.

### **Compound Identification**

All of the compounds detected in the GC/MS analyses were within the retention time windows, met the USEPA spectral matching criteria and were judged to be acceptable with the following exceptions:

2-Chloronaphthalene detected in samples J0M27, J0M30 AND J0M30DL did not meet the spectral matching criteria and were qualified as non-detected, "U", by the reviewer.

### **Tentatively Identified Compounds**

Peaks that were detected in the samples at areas  $>10\%$  of the internal standards and were not part of the target compound lists were identified as tentatively identified compounds (TICs). TICs that were both found in the sample and in the associated method blank(s) were qualified as unusable, "R." Peaks that were identified as common laboratory contaminants, solvent preservatives, column bleed or aldol condensation products were qualified as unusable, "R". The rest of the peaks identified as TICs were qualified "NJ", tentatively identified at an estimated concentration.

## Laboratory Contact

The laboratory was contacted for the following reasons:

The SVOC CCV performed on 9/10/02 at 23:49 on instrument S3 has the incorrect compound selected for atrazine. Fragment ions from pentachlorophenol appear to have been selected as atrazine. Atrazine and pentachlorophenol do not co-elute but are shown with the same retention time on page 456. The effected samples were J0M22, J0M26, J0M27, J0M30, J0M22MS and J0M22MSD.

The laboratory has resubmitted the associated forms and raw data by fax. Resubmitted hard copies and diskset deliverable had not been received at the time of this report.

## Overall Assessment

The total number of data points was 910. One hundred fifteen (13%) were qualified as estimated due values reported below the CRQL, values reported above the calibration range and calibrations. Three (0.3%) were qualified as non-detected due to blank poor spectral match.

All of the samples were analyzed in accordance with technical specifications outlined in the SOW. The data, as qualified, are acceptable and can be used for all purposes.

| Data Qualifiers |  |
|-----------------|--|
| U               | The analyte was not detected at or above the reported result.  |
| J               | The analyte was positively identified. The associated numerical result is an estimate.   |
| UJ              | The analyte was not detected at or above the reported estimated result. The associated numerical value is an estimate of the quantitation limit of the analyte in this sample. |
| R               | The data are unusable for all purposes.  |
| N               | There is evidence the analyte is present in this sample.   |
| JN              | There is evidence that the analyte is present. The associated numerical result is an estimate.   |



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
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November 5, 2002

**MEMORANDUM**

**SUBJECT:** Data validation report for the semi-volatile organic compound (SVOC) analysis of samples from the Taylor Lumber and Treating Co. site.  
Case: 30869 SDG: J0M08

**FROM:** Chris Pace, QA Chemist, OEA

**TO:** Loren McPhillips, RPM, ECL

**CC:** Bruce Woods, CLP PO, OEA  
Scott Echols, CH2M HILL

The quality assurance (QA) review of eleven water samples collected from the above referenced site has been completed. All samples were analyzed for SVOCs in accordance with the USEPA Contract Laboratory Program (CLP) Statement of Work (SOW) for Low Concentration Organic Analysis (OLC03.2) by MITKEM Corp. of Warwick, RI.

The following sample numbers were validated in this report:

J0M08 J0M09 J0M10 J0M12 J0M13  
J0M14 J0M15 J0M16 J0M17 J0M18  
J0M20

**DATA QUALIFICATIONS**

The following comments refer to the laboratory performance in meeting the Quality Control (QC) Specifications outlined in the USEPA CLP SOW for Low Concentration Organic Analysis (OLC03.2) and the USEPA CLP National Functional Guidelines for Low Concentration Organic Data Review (6/01).

The conclusions presented herein are based on the information provided for the review.

### **Holding Time/Preservation - Acceptable**

The samples were collected between 8/26 and 9/3/02, extracted on 8/30 and 9/5/02 and analyzed between 9/4 and 9/10/02. All of the samples met the technical and SOW specified holding times and were properly preserved.

### **Instrument Performance Check - Acceptable**

All of the GC/MS instrument performance checks met the ion abundance criteria. All of the samples were analyzed within an acceptable 12-hour QC period. The instruments used remained stable throughout the course of analyses.

### **Initial Calibrations (ICAL) - Acceptable**

One SVOC initial calibrations were performed. The initial calibrations met the technical acceptance criteria for the percent relative standard deviations (%RSDs) and the relative response factors (RRFs) for all target compounds and deuterated monitoring compounds (DMCs).

### **Continuing Calibration Verification (CCV)**

All of the SVOC CCV checks met the criteria for frequency of analysis, minimum RRFs and %Ds as compared to the initial calibration with the following exceptions:

X The %Ds and RRFs for the following SVOC compounds exceeded the QC limits (only those compounds that resulted in sample data qualification are listed).

| Date/Time of Analysis   | Compound   | %D/RRF            | Qualifier Detect/Non-detect | Associated Samples  |
|-------------------------|--|-------------------|-----------------------------|---------------------|
| 9/5/02<br>(1133)<br>S3  | N-nitroso-di-n-propylamine   | -30               | J/UJ                        | J0M08, J0M10, J0M12 |
| 9/7/02<br>(2135)<br>S3  | atrazine   | -27               | J/UJ                        | J0M09, J0M17        |
| 9/10/02<br>(1344)<br>S3 | bis(2-chloroethyl)ether<br>2,2-oxybis(1-chloropropane)<br>N-nitroso-di-n-propylamine | -27<br>-51<br>-32 | J/UJ<br>J/UJ<br>J/UJ        | J0M09DL, J0M12DL    |



**Quantitation Limits - Acceptable**

The quantitation limits (QLs) were based on the lowest standard concentration analyzed in the initial calibrations. Target compounds that were detected at concentrations less than the contract required quantitation limits (CRQLs) were qualified as estimated, "J". Detected compounds at concentrations over the calibration range were qualified as estimated, "J". All of the reported results were adjusted for sample amounts analyzed. The "E" and the "D" qualifiers applied by the laboratory were crossed out by the reviewer.

It is recommended that data users should utilize the results selected by the reviewer where more than one analysis was performed on a single sample or extract (i.e., dilution, re-analysis).

**Blanks**

All blanks for SVOC analysis were acceptable with the following exceptions:

| Blank  | Contaminant                | Associated Samples                |
|--------|----------------------------|-----------------------------------|
| SBLK3Y | bis(2-ethylhexyl)phthalate | J0M14, J0M15, J0M16, J0M17, J0M18 |

Bis(2-ethylhexyl)phthalate detected in the samples at concentrations less than ten times the value in their associated blank(s) were qualified as non-detects, "U".

**Analytical Sequence - Acceptable**

All of the standards, blanks, samples, and QC samples were analyzed in accordance with the SOW specified analytical sequence.

**Deuterated Monitoring Compounds (DMCs) - Acceptable**

All of the SVOC DMC recoveries met the applicable QC criteria with the following exceptions:

All samples except J0M09, J0M12 and J0M20 had high recoveries for 4-chloroaniline-d4. Target compounds associated with 4-chloroaniline-d4 were not detected in the samples and therefore, none of the data were qualified on this basis.

Sample J0M20 had a slightly low recovery for benzo(a)pyrene-d12. None of the data were qualified on this basis.

### **Matrix Spike/Matrix Spike Duplicate (MS/MSD) - Acceptable**

SVOC sample J0M08 was utilized for MS/MSD analyses. The criteria for frequency of analysis, recoveries and relative percent differences (RPDs) were met with the following exceptions:

J0M22MS had a slightly high recovery for 2,4-dinitrotoluene. None of the data were qualified on this basis.

### **Internal Standards - Acceptable**

The acceptance criteria for internal standards (IS) are  $\pm 20$  seconds for retention time (RT) shifts and -50% to +100% of the IS area as compared to the IS RT and area of the daily continuing calibration standard. All of the GC/MS analyses met the IS area and RT shift criteria.

### **Compound Identification - Acceptable**

All of the compounds detected in the GC/MS analyses were within the retention time windows, met the USEPA spectral matching criteria and were judged to be acceptable.

### **Tentatively Identified Compounds**

Peaks that were detected in the samples at areas  $>10\%$  of the internal standards and were not part of the target compound lists were identified as tentatively identified compounds (TICs). TICs that were both found in the sample and in the associated method blank(s) were qualified as unusable, "R." Peaks that were identified as common laboratory contaminants, solvent preservatives, column bleed or aldol condensation products were qualified as unusable, "R". The rest of the peaks identified as TICs were qualified "NJ", tentatively identified at an estimated concentration.

## Laboratory Contact

The laboratory was contacted for the following reasons:

The SVOC CCV performed on 9/10/02 at 13:44 on instrument S3 has the incorrect compound selected for atrazine. Fragment ions from pentachlorophenol appear to have been selected as atrazine. Atrazine and pentachlorophenol do not co-elute but are shown with the same retention time on page 308. The effected samples were J0M09DL and J0M12DL.

The laboratory has resubmitted the associated forms and raw data by fax. Resubmitted hard copies and diskset deliverable had not been received at the time of this report.

## Overall Assessment

The total number of data points was 845. Thirty eight (4.5%) were qualified as estimated due values reported below the CRQL, values reported above the calibration range and calibrations. Six (0.7%) were qualified as non-detected due to blank contamination.

All of the samples were analyzed in accordance with technical specifications outlined in the SOW. The data, as qualified, are acceptable and can be used for all purposes.

| Data Qualifiers |  |
|-----------------|--|
| U               | The analyte was not detected at or above the reported result.  |
| J               | The analyte was positively identified. The associated numerical result is an estimate.   |
| UJ              | The analyte was not detected at or above the reported estimated result. The associated numerical value is an estimate of the quantitation limit of the analyte in this sample. |
| R               | The data are unusable for all purposes.  |
| N               | There is evidence the analyte is present in this sample.   |
| JN              | There is evidence that the analyte is present. The associated numerical result is an estimate.   |



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**REGION 10**  
1200 Sixth Avenue  
Seattle, WA 98101

November 5, 2002

**MEMORANDUM**

**SUBJECT:** Data validation report for the semi-volatile organic compound (SVOC) analysis of samples from the Taylor Lumber and Treating Co. site.  
Case: 30869 SDG: J0LY9

**FROM:** Chris Pace, QA Chemist, OEA

**TO:** Loren McPhillips, RPM, ECL

**CC:** Bruce Woods, CLP PO, OEA  
Scott Echols, CH2M HILL

The quality assurance (QA) review of twenty water samples collected from the above referenced site has been completed. All samples were analyzed for SVOCs in accordance with the USEPA Contract Laboratory Program (CLP) Statement of Work (SOW) for Low Concentration Organic Analysis (OLC03.2) by MITKEM Corp. of Warwick, RI.

The following sample numbers were validated in this report:

|       |       |       |       |       |
|-------|-------|-------|-------|-------|
| J0LY9 | J0LZ0 | J0LZ1 | J0LZ2 | J0LZ3 |
| J0LZ4 | J0LZ5 | J0LZ6 | J0LZ7 | J0LZ8 |
| J0LZ9 | J0M00 | J0M01 | J0M02 | J0M03 |
| J0M04 | J0M05 | J0M06 | J0M07 | J0M19 |

**DATA QUALIFICATIONS**

The following comments refer to the laboratory performance in meeting the Quality Control (QC) Specifications outlined in the USEPA CLP SOW for Low Concentration Organic Analysis (OLC03.2) and the USEPA CLP National Functional Guidelines for Low Concentration Organic Data Review (6/01).

The conclusions presented herein are based on the information provided for the review.

### **Holding Time/Preservation - Acceptable**

The samples were collected between 8/21 and 8/26/02, extracted on 8/26 and 8/29/02 and analyzed between 8/31 and 9/12/02. All of the samples met the technical and SOW specified holding times and were properly preserved.

### **Instrument Performance Check - Acceptable**

All of the GC/MS instrument performance checks met the ion abundance criteria. All of the samples were analyzed within an acceptable 12-hour QC period. The instruments used remained stable throughout the course of analyses.

### **Initial Calibrations (ICAL) - Acceptable**

One SVOC initial calibrations were performed. The initial calibrations met the technical acceptance criteria for the percent relative standard deviations (%RSDs) and the relative response factors (RRFs) for all target compounds and deuterated monitoring compounds (DMCs).

### **Continuing Calibration Verification (CCV)**

All of the SVOC CCV checks met the criteria for frequency of analysis, minimum RRFs and %Ds as compared to the initial calibration with the following exceptions:

X The %Ds and RRFs for the following SVOC compounds exceeded the QC limits (only those compounds that resulted in sample data qualification are listed).

| Date/Time of Analysis   | Compound  | %D/RRF                   | Qualifier Detect/Non-detect  | Associated Samples  |
|-------------------------|---|--------------------------|------------------------------|---|
| 8/31/02<br>(0450)<br>S3 | 3-nitroaniline<br>atrazine  | -80<br>-57               | J/UJ<br>J/UJ                 | J0LZ0, J0LZ4, J0M01   |
| 9/5/02<br>(1133)<br>S3  | N-nitroso-di-n-propylamine  | -30                      | J/UJ                         | J0M03, J0M05  |
| 9/12/02<br>(1026)<br>S3 | bis(2-chloroethyl)ether<br>2,2-oxybis(1-chloropropane)<br>N-nitroso-di-n-propylamine<br>bis-(2-ethylhexyl)phthalate | -26<br>-53<br>-38<br>-27 | J/UJ<br>J/UJ<br>J/UJ<br>J/UJ | J0LY9, J0LZ1, J0LZ3, J0LZ5,<br>J0LZ6, J0LZ7, J0LZ8, J0LZ9,<br>J0M00 |

### **Quantitation Limits - Acceptable**

The quantitation limits (QLs) were based on the lowest standard concentration analyzed in the initial calibrations. Target compounds that were detected at concentrations less than the contract required quantitation limits (CRQLs) were qualified as estimated, "J". Detected compounds at concentrations over the calibration range were qualified as estimated, "J". All of the reported results were adjusted for sample amounts analyzed. The "E" and the "D" qualifiers applied by the laboratory were crossed out by the reviewer.

It is recommended that data users should utilize the results selected by the reviewer where more than one analysis was performed on a single sample or extract (i.e., dilution, re-analysis).

### **Blanks - Acceptable**

Bis(2-ethylhexyl)phthalate was detected below the CRQL is blank SBLK3B. Bis(2ethylhexyl)phthalate was not detected in any of the associated samples. None of the data were qualified on this basis.

### **Analytical Sequence - Acceptable**

All of the standards, blanks, samples, and QC samples were analyzed in accordance with the SOW specified analytical sequence.

### **Deuterated Monitoring Compounds (DMCs) - Acceptable**

All of the SVOC DMC recoveries met the applicable QC criteria with the following exceptions:

Many of the samples had high recoveries for 4-chloroaniline-d4. There were no associated detected results and therefore, none of the data were qualified on this basis.

### **Matrix Spike/Matrix Spike Duplicate (MS/MSD) - Acceptable**

SVOC sample J0M02 was utilized for MS/MSD analyses. The criteria for frequency of analysis, recoveries and relative percent differences (RPDs) were met with the following exceptions:

J0M02MSD had a slightly high recovery for 2,4-dinitrotoluene. None of the data were qualified on this basis.

### **Internal Standards - Acceptable**

The acceptance criteria for internal standards (IS) are  $\pm 20$  seconds for retention time (RT) shifts and -50% to +100% of the IS area as compared to the IS RT and area of the daily continuing calibration standard. All of the GC/MS analyses met the IS area and RT shift criteria.

**Compound Identification - Acceptable**

All of the compounds detected in the GC/MS analyses were within the retention time windows, met the USEPA spectral matching criteria and were judged to be acceptable.

**Tentatively Identified Compounds**

Peaks that were detected in the samples at areas >10% of the internal standards and were not part of the target compound lists were identified as tentatively identified compounds (TICs). TICs that were both found in the sample and in the associated method blank(s) were qualified as unusable, "R." Peaks that were identified as common laboratory contaminants, solvent preservatives, column bleed or aldol condensation products were qualified as unusable, "R". The rest of the peaks identified as TICs were qualified "NJ", tentatively identified at an estimated concentration.

**Laboratory Contact**

The laboratory was not contacted for this review.

**Overall Assessment**

The total number of data points was 1365. Fifty (3.7%) were qualified as estimated due values reported below the CRQL, values reported above the calibration range and calibrations.

All of the samples were analyzed in accordance with technical specifications outlined in the SOW. The data, as qualified, are acceptable and can be used for all purposes.

| Data Qualifiers |  |
|-----------------|--|
| U               | The analyte was not detected at or above the reported result.  |
| J               | The analyte was positively identified. The associated numerical result is an estimate.   |
| UJ              | The analyte was not detected at or above the reported estimated result. The associated numerical value is an estimate of the quantitation limit of the analyte in this sample. |
| R               | The data are unusable for all purposes.  |
| N               | There is evidence the analyte is present in this sample.   |
| JN              | There is evidence that the analyte is present. The associated numerical result is an estimate.   |



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 10  
1200 Sixth Avenue  
Seattle, WA 98101

November 5, 2002

**MEMORANDUM**

SUBJECT: Data validation report for the semi-volatile organic compound (SVOC) analysis of samples from the Taylor Lumber and Treating Co. site.

Case: 30869 SDG: J0M22

FROM: Chris Pace, QA Chemist, OEA 

TO: Loren McPhillips, RPM, ECL

CC: Bruce Woods, CLP PO, OEA  
Scott Echols, CH2M HILL

The quality assurance (QA) review of eight water samples collected from the above referenced site has been completed. All samples were analyzed for SVOCs in accordance with the USEPA Contract Laboratory Program (CLP) Statement of Work (SOW) for Low Concentration Organic Analysis (OLC03.2) by MITKEM Corp. of Warwick, RI.

The following sample numbers were validated in this report:

|       |       |       |       |       |
|-------|-------|-------|-------|-------|
| J0M22 | J0M23 | J0M25 | J0M26 | J0M27 |
| J0M28 | J0M29 | J0M30 |       |       |

**DATA QUALIFICATIONS**

The following comments refer to the laboratory performance in meeting the Quality Control (QC) Specifications outlined in the USEPA CLP SOW for Low Concentration Organic Analysis (OLC03.2) and the USEPA CLP National Functional Guidelines for Low Concentration Organic Data Review (6/01).

The conclusions presented herein are based on the information provided for the review.



**Holding Time/Preservation - Acceptable**

The samples were collected on 9/4 and 9/5/02, extracted on 9/6/02 and analyzed on 9/10 and 9/11/02. All of the samples met the technical and SOW specified holding times and were properly preserved.

**Instrument Performance Check - Acceptable**

All of the GC/MS instrument performance checks met the ion abundance criteria. All of the samples were analyzed within an acceptable 12-hour QC period. The instruments used remained stable throughout the course of analyses.

**Initial Calibrations (ICAL) - Acceptable**

One SVOC initial calibrations were performed. The initial calibrations met the technical acceptance criteria for the percent relative standard deviations (%RSDs) and the relative response factors (RRFs) for all target compounds and deuterated monitoring compounds (DMCs).

**Continuing Calibration Verification (CCV)**

All of the SVOC CCV checks met the criteria for frequency of analysis, minimum RRFs and %Ds as compared to the initial calibration with the following exceptions:

- The %Ds and RRFs for the following SVOC compounds exceeded the QC limits (only those compounds that resulted in sample data qualification are listed).

| Date/Time of Analysis   | Compound   | %D/RRF                  | Qualifier<br>Detect/Non-detect | Associated Samples                              |
|-------------------------|--|-------------------------|--------------------------------|---|
| 9/10/02<br>(1344)<br>S3 | bis(2-chloroethyl)ether<br>2,2-oxybis(1-chloropropane)<br>N-nitroso-di-n-propylamine | -27<br>-51<br>-32       | J/UJ<br>J/UJ<br>J/UJ           | J0M23, J0M25, J0M26DL,<br>J0M27DL, J0M28, J0M29 |
| 9/10/02<br>(2349)<br>S3 | 2,4,5-trichlorophenol<br>3-nitroaniline<br>4-nitroaniline<br>atrazine                | 33<br>-78<br>-51<br>-50 | J/none<br>J/UJ<br>J/UJ<br>J/UJ | J0M22, J0M26, J0M27, J0M30                      |
| 9/11/02<br>(1216)<br>S3 | 2,2-oxybis(1-chloropropane)<br>N-nitroso-di-n-propylamine                            | -52<br>-34              | J/UJ<br>J/UJ                   | J0M22DL, J0M23DL,<br>J0M25DL, J0M30DL           |

## **Quantitation Limits - Acceptable**

Samples J0M23 and J0M25 were analyzed at dilutions due to high analyte concentration and/or matrix interferences resulting in elevated quantitation limits (QLs).

The QLs were based on the lowest standard concentration analyzed in the initial calibrations. Target compounds that were detected at concentrations less than the contract required quantitation limits (CRQLs) were qualified as estimated, "J". Detected compounds at concentrations over the calibration range were qualified as estimated, "J". All of the reported results were adjusted for sample amounts analyzed. The "E" and the "D" qualifiers applied by the laboratory were crossed out by the reviewer.

It is recommended that data users should utilize the results selected by the reviewer where more than one analysis was performed on a single sample or extract (i.e., dilution, re-analysis).

## **Blanks - Acceptable**

All blanks for SVOC analysis were acceptable.

## **Analytical Sequence - Acceptable**

All of the standards, blanks, samples, and QC samples were analyzed in accordance with the SOW specified analytical sequence.

## **Deuterated Monitoring Compounds (DMCs)**

All of the SVOC DMC recoveries met the applicable QC criteria with the following exceptions:

DMC recoveries for samples J0M23 and J0M25 were diluted out. None of the data were qualified on this basis.

Sample J0M26 had a low recovery for benzo(a)pyrene-d12. Associated sample results were qualified as estimated, "J/UJ".

Sample J0M27 had a high recovery for 4-chloroaniline-d4. There were no associated detected results and therefore, none of the data were qualified on this basis.

Sample J0M28 had a slightly low recovery for benzo(a)pyrene-d12. None of the data were qualified on this basis.

### **Matrix Spike/Matrix Spike Duplicate (MS/MSD) - Acceptable**

SVOC sample J0M22 was utilized for MS/MSD analyses. The criteria for frequency of analysis, recoveries and relative percent differences (RPDs) were met with the following exceptions:

J0M22MS/MSD had slightly high recoveries for 2,4-dinitrotoluene. None of the data were qualified on this basis.

The recoveries for pentachlorophenol in samples J0M22MS/MSD could not be determined accurately due to the high concentration of pentachlorophenol native to the sample. None of the data were qualified on this basis.

### **Internal Standards - Acceptable**

The acceptance criteria for internal standards (IS) are  $\pm 20$  seconds for retention time (RT) shifts and -50% to +100% of the IS area as compared to the IS RT and area of the daily continuing calibration standard. All of the GC/MS analyses met the IS area and RT shift criteria.

### **Compound Identification**

All of the compounds detected in the GC/MS analyses were within the retention time windows, met the USEPA spectral matching criteria and were judged to be acceptable with the following exceptions:

2-Chloronaphthalene detected in samples J0M27, J0M30 AND J0M30DL did not meet the spectral matching criteria and were qualified as non-detected, "U", by the reviewer.

### **Tentatively Identified Compounds**

Peaks that were detected in the samples at areas  $>10\%$  of the internal standards and were not part of the target compound lists were identified as tentatively identified compounds (TICs). TICs that were both found in the sample and in the associated method blank(s) were qualified as unusable, "R." Peaks that were identified as common laboratory contaminants, solvent preservatives, column bleed or aldol condensation products were qualified as unusable, "R". The rest of the peaks identified as TICs were qualified "NJ", tentatively identified at an estimated concentration.

## Laboratory Contact

The laboratory was contacted for the following reasons:

The SVOC CCV performed on 9/10/02 at 23:49 on instrument S3 has the incorrect compound selected for atrazine. Fragment ions from pentachlorophenol appear to have been selected as atrazine. Atrazine and pentachlorophenol do not co-elute but are shown with the same retention time on page 456. The effected samples were J0M22, J0M26, J0M27, J0M30, J0M22MS and J0M22MSD.

The laboratory has resubmitted the associated forms and raw data by fax. Resubmitted hard copies and diskset deliverable had not been received at the time of this report.

## Overall Assessment

The total number of data points was 910. One hundred fifteen (13%) were qualified as estimated due values reported below the CRQL, values reported above the calibration range and calibrations. Three (0.3%) were qualified as non-detected due to blank poor spectral match.

All of the samples were analyzed in accordance with technical specifications outlined in the SOW. The data, as qualified, are acceptable and can be used for all purposes.

| Data Qualifiers |  |
|-----------------|--|
| U               | The analyte was not detected at or above the reported result.  |
| J               | The analyte was positively identified. The associated numerical result is an estimate.   |
| UJ              | The analyte was not detected at or above the reported estimated result. The associated numerical value is an estimate of the quantitation limit of the analyte in this sample. |
| R               | The data are unusable for all purposes.  |
| N               | There is evidence the analyte is present in this sample.   |
| JN              | There is evidence that the analyte is present. The associated numerical result is an estimate.   |



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 10  
1200 Sixth Avenue  
Seattle, WA 98101

November 5, 2002

**MEMORANDUM**

SUBJECT: Data validation report for the semi-volatile organic compound (SVOC) analysis of samples from the Taylor Lumber and Treating Co. site.  
Case: 30869 SDG: J0LY9

FROM: Chris Pace, QA Chemist, OEA 

TO: Loren McPhillips, RPM, ECL

CC: Bruce Woods, CLP PO, OEA  
Scott Echols, CH2M HILL

The quality assurance (QA) review of twenty water samples collected from the above referenced site has been completed. All samples were analyzed for SVOCs in accordance with the USEPA Contract Laboratory Program (CLP) Statement of Work (SOW) for Low Concentration Organic Analysis (OLC03.2) by MITKEM Corp. of Warwick, RI.

The following sample numbers were validated in this report:

|       |       |       |       |       |
|-------|-------|-------|-------|-------|
| J0LY9 | J0LZ0 | J0LZ1 | J0LZ2 | J0LZ3 |
| J0LZ4 | J0LZ5 | J0LZ6 | J0LZ7 | J0LZ8 |
| J0LZ9 | J0M00 | J0M01 | J0M02 | J0M03 |
| J0M04 | J0M05 | J0M06 | J0M07 | J0M19 |

**DATA QUALIFICATIONS**

The following comments refer to the laboratory performance in meeting the Quality Control (QC) Specifications outlined in the USEPA CLP SOW for Low Concentration Organic Analysis (OLC03.2) and the USEPA CLP National Functional Guidelines for Low Concentration Organic Data Review (6/01).

The conclusions presented herein are based on the information provided for the review.

### **Holding Time/Preservation - Acceptable**

The samples were collected between 8/21 and 8/26/02, extracted on 8/26 and 8/29/02 and analyzed between 8/31 and 9/12/02. All of the samples met the technical and SOW specified holding times and were properly preserved.

### **Instrument Performance Check - Acceptable**

All of the GC/MS instrument performance checks met the ion abundance criteria. All of the samples were analyzed within an acceptable 12-hour QC period. The instruments used remained stable throughout the course of analyses.

### **Initial Calibrations (ICAL) - Acceptable**

One SVOC initial calibrations were performed. The initial calibrations met the technical acceptance criteria for the percent relative standard deviations (%RSDs) and the relative response factors (RRFs) for all target compounds and deuterated monitoring compounds (DMCs).

### **Continuing Calibration Verification (CCV)**

All of the SVOC CCV checks met the criteria for frequency of analysis, minimum RRFs and %Ds as compared to the initial calibration with the following exceptions:

- The %Ds and RRFs for the following SVOC compounds exceeded the QC limits (only those compounds that resulted in sample data qualification are listed).

| Date/Time of Analysis   | Compound  | %D/RRF                   | Qualifier Detect/Non-detect  | Associated Samples  |
|-------------------------|---|--------------------------|------------------------------|---|
| 8/31/02<br>(0450)<br>S3 | 3-nitroaniline<br>atrazine  | -80<br>-57               | J/UJ<br>J/UJ                 | J0LZ0, J0LZ4, J0M01   |
| 9/5/02<br>(1133)<br>S3  | N-nitroso-di-n-propylamine  | -30                      | J/UJ                         | J0M03, J0M05  |
| 9/12/02<br>(1026)<br>S3 | bis(2-chloroethyl)ether<br>2,2-oxybis(1-chloropropane)<br>N-nitroso-di-n-propylamine<br>bis-(2-ethylhexyl)phthalate | -26<br>-53<br>-38<br>-27 | J/UJ<br>J/UJ<br>J/UJ<br>J/UJ | J0LY9, J0LZ1, J0LZ3, J0LZ5,<br>J0LZ6, J0LZ7, J0LZ8, J0LZ9,<br>J0M00 |

### **Quantitation Limits - Acceptable**

The quantitation limits (QLs) were based on the lowest standard concentration analyzed in the initial calibrations. Target compounds that were detected at concentrations less than the contract required quantitation limits (CRQLs) were qualified as estimated, "J". Detected compounds at concentrations over the calibration range were qualified as estimated, "J". All of the reported results were adjusted for sample amounts analyzed. The "E" and the "D" qualifiers applied by the laboratory were crossed out by the reviewer.

It is recommended that data users should utilize the results selected by the reviewer where more than one analysis was performed on a single sample or extract (i.e., dilution, re-analysis).

### **Blanks - Acceptable**

Bis(2-ethylhexyl)phthalate was detected below the CRQL is blank SBLK3B. Bis(2ethylhexyl)phthalate was not detected in any of the associated samples. None of the data were qualified on this basis.

### **Analytical Sequence - Acceptable**

All of the standards, blanks, samples, and QC samples were analyzed in accordance with the SOW specified analytical sequence.

### **Deuterated Monitoring Compounds (DMCs) - Acceptable**

All of the SVOC DMC recoveries met the applicable QC criteria with the following exceptions:

Many of the samples had high recoveries for 4-chloroaniline-d4. There were no associated detected results and therefore, none of the data were qualified on this basis.

### **Matrix Spike/Matrix Spike Duplicate (MS/MSD) - Acceptable**

SVOC sample J0M02 was utilized for MS/MSD analyses. The criteria for frequency of analysis, recoveries and relative percent differences (RPDs) were met with the following exceptions:

J0M02MSD had a slightly high recovery for 2,4-dinitrotoluene. None of the data were qualified on this basis.

### **Internal Standards - Acceptable**

The acceptance criteria for internal standards (IS) are  $\pm 20$  seconds for retention time (RT) shifts and -50% to +100% of the IS area as compared to the IS RT and area of the daily continuing calibration standard. All of the GC/MS analyses met the IS area and RT shift criteria.

**Compound Identification - Acceptable**

All of the compounds detected in the GC/MS analyses were within the retention time windows, met the USEPA spectral matching criteria and were judged to be acceptable.

**Tentatively Identified Compounds**

Peaks that were detected in the samples at areas >10% of the internal standards and were not part of the target compound lists were identified as tentatively identified compounds (TICs). TICs that were both found in the sample and in the associated method blank(s) were qualified as unusable, "R." Peaks that were identified as common laboratory contaminants, solvent preservatives, column bleed or aldol condensation products were qualified as unusable, "R". The rest of the peaks identified as TICs were qualified "NJ", tentatively identified at an estimated concentration.

**Laboratory Contact**

The laboratory was not contacted for this review.

**Overall Assessment**

The total number of data points was 1365. Fifty (3.7%) were qualified as estimated due values reported below the CRQL, values reported above the calibration range and calibrations.

All of the samples were analyzed in accordance with technical specifications outlined in the SOW. The data, as qualified, are acceptable and can be used for all purposes.

| Data Qualifiers |  |
|-----------------|--|
| U               | The analyte was not detected at or above the reported result.  |
| J               | The analyte was positively identified. The associated numerical result is an estimate.   |
| UJ              | The analyte was not detected at or above the reported estimated result. The associated numerical value is an estimate of the quantitation limit of the analyte in this sample. |
| R               | The data are unusable for all purposes.  |
| N               | There is evidence the analyte is present in this sample.   |
| JN              | There is evidence that the analyte is present. The associated numerical result is an estimate.   |



**TAYLOR LUMBER  
Sheridan, OR**

**November 2002  
GW Sampling Event**

**VALIDATED DATA**

**CONV, PAH-SIM,  
Inorganics, SVOCs,  
Project Notes  
Regional COCs  
Form II Notes**



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 10 LABORATORY  
7411 Beach Dr. East  
Port Orchard, Washington 98366

MEMORANDUM

DATE: December 13, 2002

TO: Loren McPhillips, Project Manager

FROM: M.K.Parker, Manchester Laboratory Chemist *M.K. Parker*

SUBJECT: Classical Chemistry Analyses for Taylor Lumber Project  
(TEC-440L) : Fluoride, Chloride, Sulfate and Total Dissolved Solids for  
Samples 02474002 to 02474031

The following is a quality assurance data review of classical chemistry analyses performed at the Manchester Laboratory. The analyses were performed following USEPA and laboratory guidelines at the USEPA Manchester Environmental Laboratory (MEL), Port Orchard, WA.

This is an exception memo. All USEPA Manchester Environmental Laboratory Classical Chemistry QC criteria for the analyses were met (holding time, calibration correlation coefficient, method blank, initial and continuing calibration verification, independent calibration verification, sample duplication and matrix spike duplication) without exception.

All instrument results below the method detection limit for each analysis are qualified (U) to indicate to the data user that if the analyte is present in the samples, the concentration is below the minimum level at which the laboratory has established the practical quantitation limit.

Questions concerning the data may be directed to Kathy Parker at the Manchester Environmental Laboratory by either email ([parker.katherine@epa.gov](mailto:parker.katherine@epa.gov)) or telephone (360.871.8716).

## USEPA Manchester Environmental Laboratory Classical Chemistry QC Criteria

| Analyte in water sample  | Instrument Precision Check                 | Laboratory Control Sample | Laboratory Fortified Blank | Matrix Spike / Duplicate Spike | Duplicate Precision                               | Holding Time  |
|--|--|---------------------------|----------------------------|--------------------------------|---|---|
| Alkalinity,<br>Nitrate in Drinking water,<br>Nitrite in Drinking water,<br>Orthophosphate in Drinking Water,<br>TKN in Drinking water                  | 90-110%                                    | 90-110%                   | 90-110%                    | 90-110%                        | RPD<20%   | 14 days<br>48 hours<br>48 hours<br>48 hours<br>28 days                                  |
| Ammonia,<br>Cyanide,<br>TOC  | 90-110%                                    | 85-115%                   | 90-110%                    | 75-125%                        | RPD<20%   | 28 days<br>14 days<br>28 days   |
| Anions,<br>Hardness,<br>Hexachrome,<br>Mercury by 245.1,<br>NO <sub>2</sub> +NO <sub>3</sub> ,<br>Perchlorate,<br>Silica,<br>Total Phosphorus,<br>TKN, | 90-110%                                    | 90-110%                   | 90-110%                    | 75-125%                        | RPD<20%   | 28 days<br>28 days<br>28 days<br>28 days<br>24 hours<br>6 months<br>6 months<br>28 days |
| BOD  | 90-110%                                    | 80-120%                   | NA                         | NA                             | RPD<20%   | 48 hours  |
| Conductivity   | 90-110%                                    | 90-110%                   | NA                         | NA                             | RPD<20%   | Immediate   |
| Cyanide in Drinking Water  | 90-110%                                    | 85-115%                   | 90-110%                    | 90-110%                        | RPD<20%   | 14 days   |
| Chlorate,<br>Chlorite,<br>Bromate  | >10xMRL:<br>85-115%<br><10xMRL:<br>75-125% | 85-115%                   | 90-110%                    | 75-125%                        | RPD<20%<br>Surrogate:<br>90-110%,<br>PGF:0.8-1.15 | 28 days<br>28 days<br>28 days   |
| Flashpoint   | NA   | 25 to 31C                 | NA                         | NA                             | NA  | none  |
| Mercury by 1631E   | 79-121%                                    | 90-110%                   | 90-110%                    | 75-125%                        | RPD<20%   | 6 months  |
| Nitrate,<br>Nitrite,<br>Orthophosphate   | 90-110%                                    | 80-120%                   | 90-110%                    | 75-125%                        | RPD<20%   | 48 hours<br>48 hours<br>48 hours  |
| O&G  | NA   | 78-114%                   | NA                         | 78-114%                        | RPD<18%   | 28 days   |
| pH   | +/-0.05                                    | +/-0.1                    | NA                         | NA                             | DUP:+/-0.1  | Immediate   |
| Solids,<br>Turbidity,<br>Water by KF   | NA   | 90-110%                   | NA                         | NA                             | RPD<20%   | 7 days<br>immediate<br>none   |
| Sulfide  | NA   | 80-120%                   | NA                         | 75-125%                        | RPD<20%   | 7 days  |



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1200 Sixth Avenue  
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Environmental Cleanup Office


IN REPLY

REFER TO: OEA-095

December 16, 2002

MEMORANDUM

SUBJECT: Taylor Lumber and Treating, CLP Metals Analysis, Data  
Validation  
Case: 31194  
SDG: MJ0TE2

FROM:   
Laura Castrilli, Chemist  
Quality Assurance, Monitoring & Assessment Unit, OEA

TO: Loren McPhillips, Remedial Project Manager  
Office of Environmental Cleanup

CC: Bruce Woods, Region 10 CLP TPO  
Trish Larson, CH2M HILL  
Scott Echols, CH2M HILL

The following is a validation of ICP-AES and mercury analyses of fifteen water samples from the Taylor Lumber and Treating site. The analyses were performed following the USEPA Contract Laboratory Program Statement of Work for Inorganics Analysis Multi-media, Multi-Concentration, ILM04.1. Analyses were conducted by Sentinel Inc., Huntsville, Alabama. This validation was conducted for the following samples:

|        |        |        |        |        |
|--------|--------|--------|--------|--------|
| MJ0TE2 | MJ0TG0 | MJ0TG3 | MJ0TG7 | MJ0TH2 |
| MJ0TE3 | MJ0TG1 | MJ0TG5 | MJ0TH0 | MJ0TH3 |
| MJ0TF0 | MJ0TG2 | MJ0TG6 | MJ0TH1 | MJ0TH4 |

**Data Qualifications**

The following comments refer to Sentinel's performance in meeting quality control specifications outlined in the *CLP Statement of Work (CLP-SOW) for Inorganic Analysis, rev. ILM04.1*. The comments presented herein are based on the information provided for the review.

**1.0 Timeliness - Acceptable**

The technical (40 CFR part 136) holding time from the date of collection for mercury in water is 28 days. The holding time for the remaining metals in water is 180 days. The samples were collected between 11/21/02 and 11/22/02. Mercury analyses were completed on 12/04/02. ICP-AES analyses were completed on 12/04/02. All analyses

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were conducted within the technical water holding times, therefore no qualification was made based on holding time.

## **2.0 Sample Preparation - Acceptable**

The samples were prepared for ICP-AES and mercury analyses on 12/03/02. No qualification was made based on sample preparation.

## **3.0 Calibrations/Calibration Verifications - Acceptable**

The samples were analyzed for mercury by CVAAS on 12/04/02. The initial calibration included one blank and six standards. The curve was linear with a correlation coefficient greater than 0.995.

The samples were analyzed by ICP-AES on 12/03/02 and 12/04/02. The instrument was standardized each day of analysis according to the analytical method using one blank and one calibration standard for each element.

All ICP-AES and CVAAS (mercury) calibrations were performed as required and met the acceptance criteria; therefore, no qualification was made on this basis.

Calibration verification samples are required before and after sample analysis and after every 10 samples during analysis. Mercury recoveries must be within 80-120%. Other metal recoveries must be within 90-110%.

All ICP-AES and CVAAS (mercury) calibration verification (initial and continuing) samples bracketing reported sample results met the frequency and recovery criteria; therefore no qualification was made based on ICP-AES or CVAAS calibration verification.

## **4.0 Laboratory Control Samples - Acceptable**

Laboratory Control samples (LCS) are digested and analyzed along with the samples to verify the efficiency of laboratory procedures. All recoveries associated with reported sample results met the acceptance criteria for control samples; therefore no qualification was made on this basis.

## **5.0 Blanks -**

Procedural blanks were prepared with the samples to show potential contamination from the digestion or analytical procedure. If an analyte was found in the associated blank, the sample results were qualified if the analyte concentration was less than five times the analytical value in the blank.

Magnesium and thallium were detected in a continuing calibration blank

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(CCB). Aluminum in a CCB had a negative result with an absolute value greater than the IDL.

Based on blank contamination, the following qualifications were made:

- ♦ Aluminum in samples MJ0TE2, MJ0TE3, MJ0TF0, MJ0TG0, MJ0TG1, and MJ0TG2 was qualified 'J', estimated.
- ♦ Thallium in samples MJ0TG3, MJ0TG5, MJ0TG6, MJ0TG7, MJ0TH1, MJ0TH3, and MJ0TH4 was qualified 'U', undetected.

The remaining sample results were greater than five times the associated blank levels (or were already undetected) and were not qualified on this basis.

#### **6.0 ICP-AES Interference Check Sample - Acceptable**

The interference check sample (ICS) is analyzed by ICP-AES to verify interelement and background correction factors. Analysis is required at the beginning and end of each sample analysis run and recoveries must be between 80% and 120%. All ICS-AB recoveries associated with reported sample results were within the recovery criteria. The ICS-A recoveries for chromium were high, but no analytes that interfere with chromium were at interfering levels.

There was a sample with an interfering level of calcium, however the estimated interference due to high calcium was negligible. Therefore no qualification was made based on suspected interference.

#### **7.0 Duplicate Analysis - Acceptable**

Duplicate analysis was done on sample MJ0TH2. Water duplicate results were within the  $\pm 20\%$  Relative Percent Difference (RPD) or  $\pm$ CRDL criteria for water results < 5 times the CRDL criteria; therefore no qualification was made on this basis.

#### **8.0 Matrix Spike Analysis - Acceptable**

Matrix spike sample analyses are done to provide information about the effect of the sample matrix on digestion and measurement methods. Matrix spike recovery must be within the limits of 75 - 125%.

Matrix spike analysis was done on sample MJ0TH2. All matrix spike recoveries were within the required QC limits, therefore no qualification was made based on matrix spike recovery.

#### **9.0 ICP-AES Serial Dilution - Acceptable**

Sample MJ0TH2 was analyzed by ICP-AES serial dilution to check for potential interferences. All of the analytes which exceeded the

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minimum concentration criterion (50 times the IDL) were within the 10%D criteria; therefore no qualification was made based on serial dilution.

#### 10.0 Detection Limits - Acceptable

Sample results which fall below the instrument detection limit (IDL) are assigned the value of the instrument detection limit and the 'U' qualifier is attached.

Contract Required Detection Limit (CRDL) standards are required for most analytes to demonstrate a linear calibration curve near the CRDL. CRDL standards were run at the required frequency. Data user note: results below the CRDL but above the IDL have a laboratory concentration qualifier of 'B' in the C column of the Form 1.

#### 11.0 Overall Assessment of the Data

This validation of the data is based on the criteria outlined in the *National Functional Guidelines for Inorganic Data Review (02/94)*.

There were 345 data points reported: 13 results were qualified due to blank contamination. Overall, 4 percent of the data was qualified.

Below are the definitions for the National Functional Guidelines for Inorganic Data Review (02/94) qualifiers used when validating/qualifying data from Inorganic analysis.

#### DATA QUALIFIERS

- U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
- J - The associated value is an estimated quantity.
- R - The data are unusable. (Note: Analyte may or may not be present.)
- UJ - The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.



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Environmental Cleanup Office


IN REPLY

REFER TO: OEA-095

December 16, 2002

MEMORANDUM

SUBJECT: Taylor Lumber and Treating, CLP Metals Analysis, Data  
Validation  
Case: 31194  
SDG: MJ0TE4

FROM:   
Laura Castrilli, Chemist  
Quality Assurance, Monitoring & Assessment Unit, OEA

TO: Loren McPhillips, Remedial Project Manager  
Office of Environmental Cleanup

CC: Bruce Woods, Region 10 CLP TPO  
Trish Larson, CH2M HILL  
Scott Echols, CH2M HILL

The following is a validation of ICP-AES and mercury analyses of seventeen water samples from the Taylor Lumber and Treating site. The analyses were performed following the USEPA Contract Laboratory Program Statement of Work for Inorganics Analysis Multi-media, Multi-Concentration, ILM04.1. Analyses were conducted by Sentinel Inc., Huntsville, Alabama. This validation was conducted for the following samples:

|        |        |        |        |        |        |
|--------|--------|--------|--------|--------|--------|
| MJ0TE4 | MJ0TE7 | MJ0TF1 | MJ0TF5 | MJ0TF8 | MJ0TG8 |
| MJ0TE5 | MJ0TE8 | MJ0TF2 | MJ0TF6 | MJ0TF9 | MJ0TG9 |
| MJ0TE6 | MJ0TE9 | MJ0TF4 | MJ0TF7 | MJ0TG4 |        |

**Data Qualifications**

The following comments refer to Sentinel's performance in meeting quality control specifications outlined in the CLP Statement of Work (CLP-SOW) for Inorganic Analysis, rev. ILM04.1. The comments presented herein are based on the information provided for the review.

**1.0 Timeliness - Acceptable**

The technical (40 CFR part 136) holding time from the date of collection for mercury in water is 28 days. The holding time for the remaining metals in water is 180 days. The samples were collected between 11/18/02 and 11/20/02. Mercury analyses were completed on 12/04/02. ICP-AES analyses were completed on 12/03/02. All analyses



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were conducted within the technical water holding times, therefore no qualification was made based on holding time.

## **2.0 Sample Preparation - Acceptable**

The samples were prepared for ICP-AES and mercury analyses on 12/02/02. No qualification was made based on sample preparation. Note that due to the small sample volume submitted for the samples in this SDG, the lab had to analyze the matrix spike and duplicate on separate samples. Also, the matrix spike and duplicate (and corresponding native) sample preparations for ICP-AES were conducted on 30 mL reduced volumes instead of the usual 50-100 mL volume required by the contract.

## **3.0 Calibrations/Calibration Verifications - Acceptable**

The samples were analyzed for mercury by CVAAS on 12/04/02. The initial calibration included one blank and six standards. The curve was linear with a correlation coefficient greater than 0.995.

The samples were analyzed by ICP-AES on 12/03/02. The instrument was standardized each day of analysis according to the analytical method using one blank and one calibration standard for each element.

All ICP-AES and CVAAS (mercury) calibrations were performed as required and met the acceptance criteria; therefore, no qualification was made on this basis.

Calibration verification samples are required before and after sample analysis and after every 10 samples during analysis. Mercury recoveries must be within 80-120%. Other metal recoveries must be within 90-110%.

All ICP-AES and CVAAS (mercury) calibration verification (initial and continuing) samples bracketing reported sample results met the frequency and recovery criteria; therefore no qualification was made based on ICP-AES or CVAAS calibration verification.

## **4.0 Laboratory Control Samples - Acceptable**

Laboratory Control samples (LCS) are digested and analyzed along with the samples to verify the efficiency of laboratory procedures. All recoveries associated with reported sample results met the acceptance criteria for control samples; therefore no qualification was made on this basis.

## **5.0 Blanks -**

Procedural blanks were prepared with the samples to show potential contamination from the digestion or analytical procedure. If an

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analyte was found in the associated blank, the sample results were qualified if the analyte concentration was less than five times the analytical value in the blank.

Calcium and zinc were detected in a continuing calibration blank (CCB). Thallium in a CCB had a negative result with an absolute value greater than the IDL.

Based on blank contamination, the following qualifications were made:

- ♦ Thallium in samples MJ0TE6 through MJ0TE9, MJ0TF1, MJ0TF2, MJ0TF4, MJ0TF5, MJ0TF8, MJ0TF9, MJ0TG4, MJ0TG8, and MJ0TG9 was qualified 'UJ', estimated detection limit.

The remaining sample results were greater than five times the associated blank levels (or were already undetected) and were not qualified on this basis.

#### **6.0 ICP-AES Interference Check Sample - Acceptable**

The interference check sample (ICS) is analyzed by ICP-AES to verify interelement and background correction factors. Analysis is required at the beginning and end of each sample analysis run and recoveries must be between 80% and 120%. All ICS-AB recoveries associated with reported sample results were within the recovery criteria. The ICS-A recoveries for chromium were high, but no analytes that interfere with chromium were at interfering levels.

There was a sample with an interfering level of calcium, however the estimated interference due to high calcium was negligible. Therefore no qualification was made based on suspected interference.

#### **7.0 Duplicate Analysis - Acceptable**

Duplicate analysis was done on sample MJ0TE4. Water duplicate results were within the  $\pm 20\%$  Relative Percent Difference (RPD) or  $\pm$ CRDL criteria for water results < 5 times the CRDL criteria; therefore no qualification was made on this basis.

#### **8.0 Matrix Spike Analysis -**

Matrix spike sample analyses are done to provide information about the effect of the sample matrix on digestion and measurement methods. Matrix spike recovery must be within the limits of 75 - 125%.

Matrix spike analysis was done on sample MJ0TE5. All matrix spike recoveries were within the required QC limits, with the exception of mercury (70%). All mercury results were qualified 'J', estimated.

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## 9.0 ICP-AES Serial Dilution - Acceptable

Sample MJ0TE4 was analyzed by ICP-AES serial dilution to check for potential interferences. All of the analytes which exceeded the minimum concentration criterion (50 times the IDL) were within the 10%D criteria; therefore no qualification was made based on serial dilution.

## 10.0 Detection Limits - Acceptable

Sample results which fall below the instrument detection limit (IDL) are assigned the value of the instrument detection limit and the 'U' qualifier is attached.

Contract Required Detection Limit (CRDL) standards are required for most analytes to demonstrate a linear calibration curve near the CRDL. CRDL standards were run at the required frequency. Data user note: results below the CRDL but above the IDL have a laboratory concentration qualifier of 'B' in the C column of the Form 1.

## 11.0 Overall Assessment of the Data

This validation of the data is based on the criteria outlined in the *National Functional Guidelines for Inorganic Data Review (02/94)*.

There were 391 data points reported: 13 results were qualified due to blank contamination and 17 results were qualified due to poor matrix spike recovery. Overall, 8 percent of the data was qualified (only counting one qualification per analyte).

Below are the definitions for the National Functional Guidelines for Inorganic Data Review (02/94) qualifiers used when validating/qualifying data from Inorganic analysis.

### DATA QUALIFIERS

- U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
- J - The associated value is an estimated quantity.
- R - The data are unusable. (Note: Analyte may or may not be present.)
- UJ - The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 10  
1200 Sixth Avenue  
Seattle, Washington 98101


IN REPLY

REFER TO: OEA-095

March 24, 2003

MEMORANDUM

SUBJECT: Taylor Lumber and Treating, CLP Metals Analysis, Data  
Validation  
Case: 31367  
SDG: MJ0TE2

FROM:   
Laura Castrilli, Chemist  
Quality Assurance, Monitoring & Assessment Unit, OEA

TO: Loren McPhillips, Remedial Project Manager  
Office of Environmental Cleanup

CC: Bruce Woods, Region 10 CLP TPO  
Trish Larson, CH2M HILL  
Scott Echols, CH2M HILL

The following is a validation of ICP-MS analyses (arsenic, lead, selenium and thallium only) of twenty water samples from the Taylor Lumber and Treating site. The analyses were performed following the USEPA Contract Laboratory Program Statement of Work for Inorganics Analysis Multi-media, Multi-Concentration, ILM05.2. Analyses were conducted by Ceimic Corporation, Narragansett, Rhode Island. This ICP-MS validation was conducted for the following samples:

|        |        |        |        |        |        |        |
|--------|--------|--------|--------|--------|--------|--------|
| MJ0TE2 | MJ0TE5 | MJ0TE8 | MJ0TF1 | MJ0TF5 | MJ0TF8 | MJ0TG1 |
| MJ0TE3 | MJ0TE6 | MJ0TE9 | MJ0TF2 | MJ0TF6 | MJ0TF9 | MJ0TG2 |
| MJ0TE4 | MJ0TE7 | MJ0TF0 | MJ0TF4 | MJ0TF7 | MJ0TG0 |        |

**Data Qualifications**

The following comments refer to Ceimic's performance in meeting quality control specifications outlined in the CLP Statement of Work (CLP-SOW) for Inorganic Analysis, rev. ILM05.2 and the Functional Guidelines for Inorganic Data Review (July 2002); utilizing professional judgement of the reviewer. The comments presented herein are based on the information provided for the review.

**1.0 Timeliness - Acceptable**

The technical (40 CFR-part 136) holding time from the date of collection for metals in water is 180 days. The samples were collected between 11/18/02 and 11/21/02. ICP-MS analyses were

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completed on 02/11/03. All analyses were conducted within the technical water holding times, therefore no qualification was made based on holding time.

## **2.0 Sample Preparation - Acceptable**

The samples were prepared for ICP-MS analyses on 02/06/03 and 02/10/93. A reduced sample volume of 50 mL was used for the lab QC samples. No qualification was made based on sample preparation.

## **3.0 ICP-MS Tune -**

It was not possible to verify the tune information reported on the Form 14's. The raw tune results do not indicate the number of replicates and the lab's software is currently not capable of including the tune's on the run logs. Since we are still working through software issues for the new contract and don't have definitive raw data, results will not be qualified based on the tune information. Once the software issues are resolved, and tune information can be independently verified based on instrument reports, tune data will be used for data qualification.

The laboratory's TPO is aware that the lab is working with the software vendor who will be developing patches so that the forms/raw data can be generated and match. The laboratory would also like clarification as to whether all the masses of the analytes in the tuning solution need to be reported on Form 14.

The following is an assessment of the tune forms and the available raw data:

Prior to instrument calibrations, the tuning solution was analyzed. The mass calibrations were within 0.1 amu for each isotope in the tuning solution. The tune information reported on the Form's 14 met the peak width at 5% peak height <0.75 amu functional guideline criteria. The %Relative Standard Deviation (RSD) for each tune mass were all within the 5% acceptance criteria.

The peak width information only matches for one analysis date, it appears the same peak width information is reported on all the tune forms. However, peak widths did vary in the raw data, and all the raw data showed peak widths that met the criteria.

## **4.0 Calibrations/Calibration Verifications -**

The samples were analyzed for arsenic, lead, selenium, and thallium by ICP-MS on 02/10/03 and 02/11/03.

The instrument was standardized each day of analysis according to the analytical method using one blank and one calibration standard for

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each element after tuning the instrument.

All ICP-MS calibrations were performed as required and met the acceptance criteria; therefore, no qualification was made on this basis.

Calibration verification samples are required before and after sample analysis and after every 10 samples during analysis. Recoveries must be within 90-110%.

All ICP-MS calibration verification (initial and continuing) samples bracketing reported sample results met the frequency and recovery criteria; with the exception of thallium associated with analyses on 02/11/03. The second CCV had a recovery of 114.6%. The third CCV had a recovery of 110.8. Thallium in the sample after the third CCV was not qualified as the recovery was so close to the acceptance criteria. Samples before and after the second CCV were MJ0TE2-MJ0TE9, MJ0TF0-MJ0TF2, and MJ0TF4-MJ0TF7. Of these samples, only detected thallium results (MJ0TE2-MJ0TE4) were qualified 'J+', estimated (high bias suspected).

#### 5.0 Blanks -

Procedural blanks were prepared with the samples to show potential contamination from the digestion or analytical procedure. If an analyte was found in the associated blank, the sample results were qualified if the analyte concentration was less than five times the analytical value in the blank.

Thallium was detected in one 02/07/03 continuing calibration blank. However, as the only associated analyses were for QC samples - preparation blank and a lab control sample, no qualification was made based on blank contamination.

#### 6.0 ICP-MS Interference Check Sample -

The interference check sample (ICS) is analyzed by ICP-MS to verify interelement and background correction factors. Analysis is required at the beginning of each sample analysis run and recoveries must be between 80% and 120%. All ICS-AB recoveries for reported analytes were within the recovery criteria. The ICS-A and ICS-AB recoveries for the interferents - aluminum, calcium, iron, and magnesium were not reported on the ICS form. No action was taken as these analytes are not of interest (and in most cases aren't ICP-MS ILM05.2 analytes).

Arsenic was detected in the ICS analyses associated with samples MJ0TF9, MJ0TG0-MJ0TG2. Arsenic and selenium were detected in the ICS analyses associated with the remaining samples. The other target analytes were either, not detected in the ICS-A analyses for each day or if present in the ICS-A, the recoveries were between 80-120%. A number of samples had levels of calcium similar to the level of

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calcium in the ICS-A. Arsenic in samples MJ0TE2, MJ0TE3, MJ0TF0, MJ0TF4, and MJ0TF6 was qualified 'J+', estimated (suspected high bias). Selenium results were not qualified as the estimated interference due to high calcium was negligible.

#### 7.0 Laboratory Control Samples - Acceptable

Laboratory Control samples (LCS) are digested and analyzed along with the samples to verify the efficiency of laboratory procedures. All recoveries associated with reported sample results met the acceptance criteria for control samples; therefore no qualification was made on this basis.

#### 8.0 Duplicate Analysis - Acceptable

Duplicate analysis was done on sample MJ0TE4. Water duplicate results were within the  $\pm 20\%$  Relative Percent Difference (RPD) or  $\pm$ CRQL criteria for water results < 5 times the CRQL criteria; therefore no qualification was made on this basis.

#### 9.0 Matrix Spike Analysis -

Matrix spike sample analyses are done to provide information about the effect of the sample matrix on digestion and measurement methods. Matrix spike recovery must be within the limits of 75 - 125%.

Matrix spike analysis was done on sample MJ0TE3. All matrix spike recoveries were within the required QC limits; with the exception of selenium (60%). All selenium results were qualified 'J-', estimated (low bias suspected).

#### 10.0 ICP-MS Serial Dilution - Acceptable

Sample MJ0TF0 was analyzed by ICP-MS serial dilution to check for potential interferences. All of the analytes which exceeded the minimum concentration criterion (50 times the MDL) were within the 10%D criteria; therefore no qualification was made based on serial dilution.

#### 11.0 ICP-MS Internal Standards -

The laboratory added 5 internal standards to each sample, blank, QC sample etc. A minimum of 3 is required, however, the three chosen are supposed to bracket the masses of the reported analytes, which they did not for this SDG. The internal standard that is used by the laboratory's instrument to assess lead and thallium (masses 208 and 205) results is holmium which has a mass of 165. The only internal standard in the SOW with a higher mass than lead and thallium is bismuth (mass 209). In the reviewer's opinion, the holmium internal standard mass is close enough to the mass of lead and thallium and no qualification was made based on the mass of internal standards.

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The relative (to the internal standard response in the calibration blank) percent recoveries for the internal standards were all within the 60-125% acceptance criteria; therefore no qualification was made based on internal standards.

## **12.0 Detection Limits - Acceptable**

Sample results which fall below the method detection limit (MDL) are assigned the value of the CRQL and the 'U' qualifier is attached. This is a major difference from past SOWs where non detects were reported down to the instrumental detection limit. For data users' convenience, the MDLs for this SDG have been attached.

Contract Required Quantitation Limit (CRQL) standards are required for most analytes to demonstrate a linear calibration curve near the CRQL. CRQL standards were run at the required frequency. The new SOW requires that CRQL standards be re-analyzed if the recovery criteria have not been met and if they are still not met, the instrument has to be re-calibrated and affected samples/analytes have to be re-analyzed. All CRQL results were within the general 70-130% recovery criteria.

## **13.0 Overall Assessment of the Data**

For ILM05.2, the laboratory is required to flag all detected results below the CRQL with a 'J' concentration qualifier (result below the CRQL but above the MDL).

Also new with ILM05.2, a laboratory 'D' qualifier in the qualification column indicates that a result is reported from a dilution analysis.

Electronic data submitted for this SDG was not usable as CADRE 'R' qualified the data due to lack of electronic tuning and internal standard information. In addition, the original Form I's for the case were incorrect. One of the main reasons the lab was contacted is that the raw data for ICP-MS should not match the final Form I data for samples that are prepared using the HW2 preparation procedure (a factor of 1.25 should be applied to raw data to obtain final data). The laboratory re-submitted the form data for the SDG on 03/20/03. Qualified Form I's from the re-submitted package are attached. Electronic site data should be corrected as necessary using the attached forms. An E-mail response from the laboratory with the history/original inquiry is also attached to this memo.

There were 80 data points reported: 3 results were qualified due to calibration verification recovery, 5 results were qualified due to suspected interference, and 20 results were qualified due to matrix spike recovery. Overall, 35 percent of the data was qualified.

Below are the definitions for the National Functional Guidelines for Inorganic Data Review (07/02) qualifiers used when validating/qualifying data from Inorganic analysis.



*March 24, 2003*

DATA QUALIFIERS

- U - The material was analyzed for, but was not detected above the level of the reported sample quantitation limit.
- J - The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
- J+ - The result is an estimated quantity, but the result may be biased high.
- J- - The result is an estimated quantity, but the result may be biased low.
- R - The data are unusable. The sample results are rejected due to serious deficiencies in meeting QC criteria. The analyte may or may not be present in the sample.
- UJ - The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
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Seattle, WA 98101

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JAN 16 2003

Environmental Cleanup Office

January 13, 2003

**MEMORANDUM**

**SUBJECT:** Data validation report for the semi-volatile organic compound (SVOC) full scan and selected ion monitoring (SIM) analysis of samples from the Taylor Lumber and Treating Company site.  
Case: 31194 SDGs: J0TF5 (full scan), J0TG8 (SIM)

**FROM:** Chris Pace, QA Chemist, OEA *CP*

**TO:** Loren McPhillips, RPM, ECL

**CC:** Bruce Woods, CLP PO, OEA

The quality assurance (QA) review of twenty water samples collected from the above referenced site has been completed. All samples were analyzed for SVOCs in accordance with the USEPA Contract Laboratory Program (CLP) Statement of Work (SOW) for Organic Analyses (OLC03.2) with the Flexibility Clause, Modification Reference Number R10SIM111402 by CompuChem of Cary, NC.

The following sample numbers were validated in this report:

|       |       |       |       |       |
|-------|-------|-------|-------|-------|
| J0TE2 | J0TE3 | J0TE4 | J0TE5 | J0TE6 |
| J0TE7 | J0TE8 | J0TE9 | J0TF1 | J0TF2 |
| J0TF4 | J0TF5 | J0TF6 | J0TF7 | J0TF8 |
| J0TF9 | J0TG4 | J0TG8 | J0TG9 | J0TH2 |

**DATA QUALIFICATIONS**

The following comments refer to the laboratory performance in meeting the Quality Control (QC) Specifications outlined in the USEPA CLP SOW for Organic Analysis (OLC03.2) with the Flexibility Clause, Modification Reference Number R10SIM111402, USEPA CLP National Functional Guidelines for Organic Data Review (10/99), USEPA CLP National Functional Guidelines for Low Concentration Organic Data Review (6/01) and professional judgement.

The conclusions presented herein are based on the information provided for the review.

### **Holding Time/Preservation - Acceptable**

The samples were collected between 11/18 and 11/21/02, extracted between 11/21 and 11/25/02 and analyzed between 11/27 and 12/14/02. All of the samples met the technical and SOW specified holding times and were properly preserved.

### **Instrument Performance Check - Acceptable**

All of the GC/MS instrument performance checks met the ion abundance criteria. All of the samples were analyzed within an acceptable 12-hour QC period. The instruments used remained stable throughout the course of analyses.

### **Initial Calibrations (ICAL)**

Two full scan and one SIM initial calibrations were performed. The initial calibrations met the technical acceptance criteria for the percent relative standard deviations (%RSDs) and the average relative response factors (RRFs) for all target compounds and deuterated monitoring compounds (DMCs) with the following exceptions:

- ▶ SVOC ICAL 10/09/02 HP66 - The %RSD for benzaldehyde, atrazine and pentachlorophenol exceeded the applicable QC criteria of 30%. The high end of the benzaldehyde ICAL was non-linear. Associated benzaldehyde results in the non-linear portion of the curve were qualified as estimated, "J". The atrazine ICAL was non-linear and associated results were qualified as estimated, "J/UJ". The low end of the pentachlorophenol ICAL was non-linear. Associated pentachlorophenol results in the non-linear portion of the curve were qualified as estimated, "J/UJ". Associated samples - All except J0TE2, J0TE3, J0TE5, J0TF4DL and J0TH2.
- ▶ SVOC ICAL 12/09/02 HP66 - The %RSD for benzaldehyde and atrazine exceeded the applicable QC criteria of 30%. The benzaldehyde and atrazine ICALs were non-linear and associated results were qualified as estimated, "J/UJ". Associated samples - J0TE2, J0TE3, J0TE5, J0TF4DL and J0TH2.
- ▶ SIM ICAL 12/12/02 HP60 - The %RSD for pentachlorophenol exceeded the applicable QC criteria of 30%. The pentachlorophenol ICAL was non-linear and associated results were qualified as estimated, "J/UJ". Associated samples - All SIM results.

### **Continuing Calibration Verification (CCV)**

All of the CCV checks met the criteria for frequency of analysis, minimum RRFs (0.05) and %Ds (25%) as compared to the initial calibration with the following exceptions:

- The %Ds and RRFs for the following compound(s) exceeded the QC limits.

| Date/Time of Analysis      | Compound   | %D/<br>RRF  | Qualifier<br>Detect/Non-<br>detect  | Associated<br>Samples   |
|----------------------------|--|---|---|---|
| 11/27/02<br>(1241)<br>HP66 | nitrobenzene<br>4-chloroaniline<br>hexachlorobutadiene<br>hexachlorocyclopentadiene<br>4-nitrophenol<br>N-nitrosodiphenylamine<br>atrazine<br>di-n-octylphthalate<br>phenol-d5 (surr.)<br>4-chloroaniline-d4 (surr.)   | 31<br>-34<br>52<br>29<br>46<br>-28<br>54<br>-28<br>-52<br>-28                             | J/None<br>J/UJ<br>J/None<br>J/None<br>J/None<br>J/UJ<br>J/None<br>J/UJ<br>None<br>None                      | J0TE4, J0TE6, J0TE7, J0TE8,<br>J0TE9, J0TF1                         |
| 11/29/02<br>(1030)<br>HP66 | 4-chloroaniline<br>hexachlorobutadiene<br>caprolactam<br>2-nitroaniline<br>4-nitrophenol<br>atrazine<br>pentachlorophenol<br>di-n-octylphthalate<br>benzo(g,h,i)perylene<br>phenol-d5 (surr.)<br>4-chloroaniline-d4 (surr.)  | -36<br>39<br>-26<br>30<br>80<br>-58/0.048<br>34<br>-30<br>33<br>-50<br>-29                | J/UJ<br>J/None<br>None<br>J/None<br>J/None<br>J/UJ<br>J/None<br>J/UJ<br>J/None<br>None<br>None              | J0TF4, J0TF5, J0TF6, J0TF7,<br>J0TF8, J0TF9, J0TG4, J0TG8,<br>J0TG9 |
| 12/03/02<br>(1137)<br>HP66 | benzaldehyde<br>4-chloroaniline<br>hexachlorobutadiene<br>caprolactam<br>hexachlorocyclopentadiene<br>2-nitroaniline<br>4-nitrophenol<br>4-nitroaniline<br>N-nitrosodiphenylamine<br>atrazine<br>3,3'-dichlorobenzidine<br>phenol-d5 (surr.)<br>4-chloroaniline-d4 (surr.) | -31<br>-57<br>45<br>-27<br>28<br>28<br>49<br>-33<br>-37<br>-74/0.030<br>-81<br>-50<br>-39 | J/UJ<br>J/UJ<br>J/None<br>J/UJ<br>J/None<br>J/None<br>J/None<br>J/UJ<br>J/UJ<br>J/R<br>J/UJ<br>None<br>None | J0TF2   |
| 12/10/02<br>(0931)<br>HP66 | atrazine   | -83/0.020   | J/R   | J0TE2, J0TE3, J0TH2   |
| 12/10/02<br>(2144)<br>HP66 | 3-nitroaniline<br>atrazine   | 31<br>-84/0.019   | J/None<br>J/R   | J0TE5, J0TF4DL  |

### Quantitation Limits - Acceptable

Target compounds that were detected at concentrations less than the contract required quantitation limit (CRQL) were qualified as estimated, "J". Detected compounds at concentrations over the calibration range were qualified as estimated, "J". All of the reported results were adjusted for sample amounts analyzed. The "E" and "D" qualifiers applied by the laboratory were crossed-out by the reviewer.

It is recommended that data users should utilize the results selected by the reviewer where more than one analysis was performed on a single extract (i.e., SIM, dilution, re-analysis).

### Blanks

All blanks for the analyses were acceptable with the following exceptions:

| Blank              | Contaminant                | Associated Samples   |
|--------------------|----------------------------|--|
| full scan - SBLKXX | bis(2-ethylhexyl)phthalate | J0TE6, J0TE7, J0TE8, J0TE9, J0TF4, J0TF4DL, J0TF6, J0TF7             |
| SIM - SBLKWV       | phenanthrene               | J0TE4, J0TE5, J0TF1, J0TF2, J0TF5, J0TF8, J0TF9, J0TG4, J0TG8, J0TG9 |

Bis(2-ethylhexyl)phthalate detected in the samples at concentrations less than ten times the value in their associated blank(s) were qualified as non-detects, "U". Phenanthrene detected in the samples at concentrations less than five times the value in their associated blank(s) were qualified as non-detects, "U". The "B" qualifiers applied by the laboratory were crossed out by the reviewer.

### Analytical Sequence - Acceptable

All of the standards, blanks, samples, and QC samples were analyzed in accordance with the SOW specified analytical sequence.

### Deuterated Monitoring Compounds (DMCs)

All of the SVOC DMC recoveries met or only slightly exceeded the applicable QC criteria with the following exceptions:

| DMC (Limits)                       | Sample   | Percent Recovery | Associated Compound Qualifiers<br>Detect/Non-detect |
|------------------------------------|----------|------------------|---|
| phenol-5 (10-110)                  | J0TE3    | 120              | J/None  |
| bis(2-chloroethyl)ether-d8 (41-94) | J0TE5    | 100              | J/None  |
| 4-methylphenol-d8 (38-95)          | J0TF9    | 105              | J/None  |
| 4-chloroaniline-d4 (8-70)          | J0TE2    | 113              | J/None  |
|                                    | J0TE3    | 100              | J/None  |
|                                    | J0TE4    | 125              | J/None  |
|                                    | J0TE5    | 126              | J/None  |
|                                    | J0TE6    | 114              | J/None  |
|                                    | J0TE7    | 88               | J/None  |
|                                    | J0TE8    | 105              | J/None  |
|                                    | J0TE9    | 89               | J/None  |
|                                    | J0TF1    | 114              | J/None  |
|                                    | J0TF4    | 90               | J/None  |
|                                    | J0TF5    | 113              | J/None  |
|                                    | J0TF6    | 108              | J/None  |
|                                    | J0TF7    | 98               | J/None  |
|                                    | J0TF8    | 130              | J/None  |
|                                    | J0TF9    | 120              | J/None  |
|                                    | J0TG4    | 114              | J/None  |
|                                    | J0TG8    | 108              | J/None  |
|                                    | J0TG9    | 113              | J/None  |
|                                    | J0TH2MS  | 98               | None  |
|                                    | J0TH2MSD | 118              | None  |
| dimethylphthalate-d6 (62-102)      | J0TE3    | 108              | J/None  |
|                                    | J0TH2MSD | 110              | J/None  |
| fluorene-d10 (50-97)               | J0TE4    | 108              | J/None  |

DMC recoveries for sample J0TF4DL could not be accurately determined due to dilution. Qualifiers were only applied to dilution samples if the DMC recoveries in the undiluted samples were out of the applicable QC criteria.

### **Matrix Spike/Matrix Spike Duplicate (MS/MSD) - Acceptable**

SVOC sample J0TH2 was utilized for MS/MSD analyses. The criteria for frequency of analysis, recoveries and relative percent differences (RPDs) were met with the following exceptions:

Recoveries for 2,4-dinitrotoluene in samples J0TH2MS/MSD were slightly high. The recovery for 4-nitrophenol in sample J0TH2MSD was slightly high. None of the data were qualified on this basis.

### **Internal Standards - Acceptable**

The acceptance criteria for internal standards (IS) are  $\pm 30$  seconds for retention time (RT) shifts and -50% to +100% of the IS area as compared to the IS RT and area of the daily continuing calibration standard. All of the GC/MS analyses met the IS area and RT shift criteria.

### **Compound Identification - Acceptable**

All of the compounds detected in the GC/MS analyses were within the retention time windows, met the USEPA spectral matching criteria and were judged to be acceptable.

### **Tentatively Identified Compounds**

Peaks that were detected in the samples at areas  $>10\%$  of the internal standards and were not part of the target compound lists were identified as tentatively identified compounds (TICs). TICs that were both found in the sample and in the associated method blank(s) were qualified as unusable, "R." Peaks that were identified as common laboratory contaminants, solvent preservatives, column bleed or aldol condensation products were qualified as unusable, "R". The rest of the peaks identified as TICs were qualified "NJ", tentatively identified at an estimated concentration.

### **Laboratory Contact**

The laboratory was not contacted for this review.

### **Overall Assessment**

The total number of data points was 1565. One hundred seventy five (11%) were qualified as estimated due to values reported below the CRQL, values reported above the calibration range and calibrations. Thirteen (0.8%) were qualified as non-detected due to blank contamination. Six (0.4%) were qualified as unusable due to relative response factors.

All of the samples were analyzed in accordance with technical specifications outlined in the SOW. The data, as qualified, are acceptable and can be used for all purposes.

| Data Qualifiers |  |
|-----------------|--|
| U               | The analyte was not detected at or above the reported result.  |
| J               | The analyte was positively identified. The associated numerical result is an estimate.   |
| UJ              | The analyte was not detected at or above the reported estimated result. The associated numerical value is an estimate of the quantitation limit of the analyte in this sample. |
| R               | The data are unusable for all purposes.  |
| N               | There is evidence the analyte is present in this sample.   |
| JN              | There is evidence that the analyte is present. The associated numerical result is an estimate.   |





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January 14, 2003

JAN 16 2003

Environmental Cleanup Office

**MEMORANDUM**

SUBJECT: Data validation report for the semi-volatile organic compound (SVOC) full scan and selected ion monitoring (SIM) analysis of samples from the Taylor Lumber and Treating Company site.  
Case: 31194 SDGs: J0TF0 (full scan), J0TG0 (SIM)

FROM: Chris Pace, QA Chemist, OEA 

TO: Loren McPhillips, RPM, ECL

CC: Bruce Woods, CLP PO, OEA

The quality assurance (QA) review of twelve water samples collected from the above referenced site has been completed. All samples were analyzed for SVOCs in accordance with the USEPA Contract Laboratory Program (CLP) Statement of Work (SOW) for Organic Analyses (OLC03.2) with the Flexibility Clause, Modification Reference Number R10SIM111402 by CompuChem of Cary, NC.

The following sample numbers were validated in this report:

|       |       |       |       |       |
|-------|-------|-------|-------|-------|
| J0TF0 | J0TG0 | J0TG1 | J0TG2 | J0TG3 |
| J0TG5 | J0TG6 | J0TG7 | J0TH0 | J0TH1 |
| J0TH3 | J0TH4 |       |       |       |

**DATA QUALIFICATIONS**

The following comments refer to the laboratory performance in meeting the Quality Control (QC) Specifications outlined in the USEPA CLP SOW for Organic Analysis (OLC03.2) with the Flexibility Clause, Modification Reference Number R10SIM111402, USEPA CLP National Functional Guidelines for Organic Data Review (10/99), USEPA CLP National Functional Guidelines for Low Concentration Organic Data Review (6/01) and professional judgement.

The conclusions presented herein are based on the information provided for the review.

### **Holding Time/Preservation**

The samples were collected on 11/21 and 11/22/02, extracted between 11/25 and 12/03/02 and analyzed between 12/03 and 12/16/02. All of the samples met the technical and SOW specified holding times and were properly preserved with the following exceptions:

Samples J0TG3, J0TG3DL, J0TG6, J0TG6DL, J0TG7, J0TH0, J0TH4, and J0TH4DL were extracted 11 days from the collection date exceeding the technical holding time of 7 days and therefore, the detected and non-detected results were qualified as estimated, "J/UJ".

### **Instrument Performance Check - Acceptable**

All of the GC/MS instrument performance checks met the ion abundance criteria. All of the samples were analyzed within an acceptable 12-hour QC period. The instruments used remained stable throughout the course of analyses.

### **Initial Calibrations (ICAL)**

Two full scan and one SIM initial calibrations were performed. The initial calibrations met the technical acceptance criteria for the percent relative standard deviations (%RSDs) and the average relative response factors (RRFs) for all target compounds and deuterated monitoring compounds (DMCs) with the following exceptions:

- ▷ SVOC ICAL 10/09/02 HP66 - The %RSD for benzaldehyde, atrazine and pentachlorophenol exceeded the applicable QC criteria of 30%. The high end of the benzaldehyde ICAL was non-linear. Associated benzaldehyde results in the non-linear portion of the curve were qualified as estimated, "J". The atrazine ICAL was non-linear and associated results were qualified as estimated, "J/UJ". The low end of the pentachlorophenol ICAL was non-linear. Associated pentachlorophenol results in the non-linear portion of the curve were qualified as estimated, "J/UJ". Associated samples - J0TG5, J0TG5DL, J0TG6, J0TG7, J0TH0, J0TH3 and J0TH4.
- ▷ SVOC ICAL 12/09/02 HP66 - The %RSD for benzaldehyde and atrazine exceeded the applicable QC criteria of 30%. The benzaldehyde and atrazine ICALs were non-linear and associated results were qualified as estimated, "J/UJ". Associated samples - J0TF0, J0TG0, J0TG1, J0TG2, J0TG3, J0TG3DL, J0TG6DL, J0TH1 and J0TH4DL.
- ▷ SIM ICAL 12/12/02 HP60 - The %RSD for pentachlorophenol exceeded the applicable QC criteria of 30%. The pentachlorophenol ICAL was non-linear and associated results were qualified as estimated, "J/UJ". Associated samples - All SIM results.

### **Continuing Calibration Verification (CCV)**

All of the CCV checks met the criteria for frequency of analysis, minimum RRFs (0.05) and %Ds (25%) as compared to the initial calibration with the following exceptions:

The %Ds and RRFs for the following compound(s) exceeded the QC limits:

| Date/Time of Analysis      | Compound   | %D/<br>RRF  | Qualifier<br>Detect/Non-<br>detect  | Associated<br>Samples                    |
|----------------------------|--|---|---|--|
| 12/03/02<br>(1137)<br>HP66 | benzaldehyde<br>4-chloroaniline<br>hexachlorobutadiene<br>caprolactam<br>hexachlorocyclopentadiene<br>2-nitroaniline<br>4-nitrophenol<br>4-nitroaniline<br>N-nitrosodiphenylamine<br>atrazine<br>3,3'-dichlorobenzidine<br>phenol-d5 (surr.)<br>4-chloroaniline-d4 (surr.) | -31<br>-57<br>45<br>-27<br>28<br>28<br>49<br>-33<br>-37<br>-74/0.030<br>-81<br>-50<br>-39 | J/UJ<br>J/UJ<br>J/None<br>J/UJ<br>J/None<br>J/None<br>J/None<br>J/UJ<br>J/UJ<br>J/R<br>J/UJ<br>None<br>None | J0TG5, J0TG5DL, J0TH3                    |
| 12/09/02<br>(1004)<br>HP66 | 4-chloroaniline<br>hexachlorobutadiene<br>caprolactam<br>2-nitroaniline<br>3-nitroaniline<br>4-nitrophenol<br>atrazine<br>pentachlorophenol<br>di-n-octylphthalate<br>phenol-d5 (surr.)<br>4-chloroaniline-d4 (surr.)  | -45<br>51<br>-32<br>52<br>-29<br>82<br>-83/0.019<br>37<br>-31<br>-42<br>-42               | J/UJ<br>J/None<br>J/UJ<br>J/None<br>J/UJ<br>J/None<br>J/R<br>J/None<br>J/UJ<br>None<br>None                 | J0TG6, J0TG7, J0TH0, J0TH4               |
| 12/10/02<br>(0931)<br>HP66 | atrazine   | -83/0.020   | J/R   | J0TG0, J0TG1, J0TG2, J0TG6DL,<br>J0TH4DL |
| 12/10/02<br>(2144)<br>HP66 | 3-nitroaniline<br>atrazine   | 31<br>-84/0.019   | J/None<br>J/R   | J0TF0, J0TG3, J0TG3DL, J0TH1             |

### Quantitation Limits - Acceptable

Full scan sample J0TG3 and SIM samples J0TG3 and J0TG5 were initially analyzed at dilutions due to high analyte concentration and/or matrix interferences resulting in elevated quantitation limits (QLs).

Target compounds that were detected at concentrations less than the contract required quantitation limit (CRQL) were qualified as estimated, "J". Detected compounds at concentrations over the calibration range were qualified as estimated, "J". All of the reported results were adjusted for sample amounts analyzed. The "E" and "D" qualifiers applied by the laboratory were crossed-out by the reviewer.

It is recommended that data users should utilize the results selected by the reviewer where more than one analysis was performed on a single extract (i.e., SIM, dilution, re-analysis).

### Blanks

All blanks for the analyses were acceptable with the following exceptions:

| Blank        | Contaminant   | Associated Samples                         |
|--------------|---|--|
| SIM - SBLKZI | naphthalene, fluorene, phenanthrene, fluoranthene, benzo(a)anthracene, chrysene | J0TG5                                      |
| SIM - SBLKZS | fluorene, phenanthrene  | J0TG3, J0TG6, J0TG6DL, J0TG7, J0TH0, J0TH4 |

Naphthalene, fluorene, phenanthrene, fluoranthene, benzo(a)anthracene and chrysene detected in the samples at concentrations less than five times the value in their associated blank(s) were qualified as non-detects, "U". The "B" qualifiers applied by the laboratory were crossed out by the reviewer.

### Analytical Sequence - Acceptable

All of the standards, blanks, samples, and QC samples were analyzed in accordance with the SOW specified analytical sequence.

### Deuterated Monitoring Compounds (DMCs)

All of the SVOC DMC recoveries met or only slightly exceeded the applicable QC criteria with the following exceptions:

| DMC (Limits)                  | Sample | Percent Recovery | Associated Compound Qualifiers<br>Detect/Non-detect |
|-------------------------------|--------|------------------|---|
| 4-chloroaniline-d4 (8-70)     | J0TF0  | 100              | J/None  |
|                               | J0TG2  | 93               | J/None  |
|                               | J0TG5  | 6                | J/UJ  |
|                               | J0TH0  | 125              | J/None  |
|                               | J0TH1  | 97               | J/None  |
|                               | J0TH3  | 92               | J/None  |
|                               | J0TH4  | 80               | J/None  |
|                               | SBLKYF | 95               | None  |
|                               | SBLKZS | 103              | None  |
| dimethylphthalate-d6 (62-102) | J0TG5  | 113              | J/None  |

DMC recoveries for samples J0TG3, J0TG3DL, J0TG5DL, J0TG6DL, J0TH4DL could not be accurately determined due to dilution. Qualifiers were only applied to dilution samples if the DMC recoveries in the undiluted samples were out of the applicable QC criteria.

### Matrix Spike/Matrix Spike Duplicate (MS/MSD) - Acceptable

SVOC sample J0TG5 was utilized for MS/MSD analyses. The criteria for frequency of analysis, recoveries and relative percent differences (RPDs) were met with the following exceptions:

Recoveries and %RPD could not be determined accurately for acenaphthene and pentachlorophenol because of the concentrations native to the sample. The %RPD for pyrene slightly exceeded the applicable QC criteria. None of the data were qualified on the basis of MS/MSD analyses.

### Internal Standards - Acceptable

The acceptance criteria for internal standards (IS) are  $\pm 30$  seconds for retention time (RT) shifts and -50% to +100% of the IS area as compared to the IS RT and area of the daily continuing calibration standard. All of the GC/MS analyses met the IS area and RT shift criteria.

### **Compound Identification - Acceptable**

All of the compounds detected in the GC/MS analyses were within the retention time windows, met the USEPA spectral matching criteria and were judged to be acceptable.

### **Tentatively Identified Compounds**

Peaks that were detected in the samples at areas >10% of the internal standards and were not part of the target compound lists were identified as tentatively identified compounds (TICs). TICs that were both found in the sample and in the associated method blank(s) were qualified as unusable, "R." Peaks that were identified as common laboratory contaminants, solvent preservatives, column bleed or aldol condensation products were qualified as unusable, "R". The rest of the peaks identified as TICs were qualified "NJ", tentatively identified at an estimated concentration.

### **Laboratory Contact**

The laboratory was not contacted for this review.

### **Overall Assessment**

The total number of data points was 1222. Seven hundred seventy six (64%) were qualified as estimated due to values reported below the CRQL, values reported above the calibration range, DMCs, calibrations and holding times. Two (0.2%) were qualified as non-detected due to blank contamination. Fifteen (1.2%) were qualified as unusable due to relative response factors.

All of the samples were analyzed in accordance with technical specifications outlined in the SOW. The data, as qualified, are acceptable and can be used for all purposes.

| Data Qualifiers |  |
|-----------------|--|
| U               | The analyte was not detected at or above the reported result.  |
| J               | The analyte was positively identified. The associated numerical result is an estimate.   |
| UJ              | The analyte was not detected at or above the reported estimated result. The associated numerical value is an estimate of the quantitation limit of the analyte in this sample. |
| R               | The data are unusable for all purposes.  |
| N               | There is evidence the analyte is present in this sample.   |
| JN              | There is evidence that the analyte is present. The associated numerical result is an estimate.   |

**TAYLOR LUMBER  
Sheridan, OR**

**February 2003-  
GW Sampling Event  
(and some SO/SD)**

**VALIDATED DATA**

**[REDACTED], PAH-SIM,  
Inorganics, [REDACTED],  
Project Notes  
Regional COCs  
[REDACTED] Notes**





UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
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Seattle, WA 98101

EDD ✓  
RECEIVED

MAR 20 2003

Environmental Cleanup Office

March 20, 2003

**MEMORANDUM**

SUBJECT: Data validation report for the semi-volatile organic compound (SVOC) full scan and selected ion monitoring (SIM) analysis of samples from the Taylor Lumber and Treating Company site.

Case: 31431 Full Scan SDGs: J0TL4, J0TM6 SIM SDGs: J0TL5, J0TM7

FROM: Chris Pace, QA Chemist, OEA *CP*

TO: Loren McPhillips, RPM, ECL

CC: Bruce Woods, CLP PO, OEA

The quality assurance (QA) review of twenty three water samples collected from the above referenced site has been completed. All samples were analyzed for SVOCs in accordance with the USEPA Contract Laboratory Program (CLP) Statement of Work (SOW) for Organic Analyses (OLC03.2) with the Flexibility Clause, Modification Reference Number R10SIM020603 by CompuChem of Cary, NC.

The following sample numbers were validated in this report:

|       |       |       |       |       |
|-------|-------|-------|-------|-------|
| J0TK7 | J0TK8 | J0TK9 | J0TL0 | J0TL1 |
| J0TL2 | J0TL3 | J0TL4 | J0TL5 | J0TL6 |
| J0TL7 | J0TL8 | J0TL9 | J0TM0 | J0TM1 |
| J0TM2 | J0TM3 | J0TM4 | J0TM5 | J0TM6 |
| J0TM7 | J0TM8 | J0TM9 |       |       |

**DATA QUALIFICATIONS**

The following comments refer to the laboratory performance in meeting the Quality Control (QC) Specifications outlined in the USEPA CLP SOW for Organic Analysis (OLC03.2) with the Flexibility Clause, Modification Reference Number R10SIM020603, USEPA CLP National Functional Guidelines for Organic Data Review (10/99), USEPA CLP National Functional Guidelines for Low Concentration Organic Data Review (6/01) and professional judgement. The conclusions presented herein are based on the information provided for the review.

### Holding Time/Preservation - Acceptable

The samples were collected between 2/17 and 2/20/03, extracted between 2/24 and 2/26/03 and analyzed between 2/26 and 3/7/03. All of the samples met the technical and SOW specified holding times and were properly preserved.

### Instrument Performance Check - Acceptable

All of the GC/MS instrument performance checks met the ion abundance criteria. All of the samples were analyzed within an acceptable 12-hour QC period. The instruments used remained stable throughout the course of analyses.

### Initial Calibrations (ICAL) - Acceptable

One full scan and one SIM initial calibration were performed. The initial calibrations met the technical acceptance criteria for the percent relative standard deviations (%RSDs) of 30% and the average relative response factors (RRFs) of 0.05 for all target compounds and deuterated monitoring compounds (DMCs) with the following exceptions:

SIM ICAL 3/5/03 5972HP60 - The %RSD for pentachlorophenol slightly exceeded the applicable QC criteria. None of the data were qualified on this basis.

### Continuing Calibration Verification (CCV)

All of the CCV checks met the criteria for frequency of analysis, minimum RRFs of 0.05 and %Ds of  $\pm 25\%$  as compared to the initial calibration with the following exceptions:

- The %Ds and RRFs for the following compound(s) exceeded the QC limits.

| Date/Time of Analysis         | Compound                                       | %D/RRF          | Qualifier Detect/Non-detect | Associated Samples  |
|-------------------------------|--|-----------------|-----------------------------|---|
| 2/26/03<br>(0922)<br>5972HP66 | benzaldehyde<br>atrazine<br>phenol-d5 (DMC)    | 42<br>30<br>67  | J/None<br>J/None<br>None    | All associated samples were non-detects. None of the data were qualified. |
| 2/27/03<br>(1353)<br>5972HP66 | benzaldehyde<br>caprolactam<br>phenol-d5 (DMC) | 39<br>-65<br>60 | J/None<br>J/UJ<br>None      | J0TL3, J0TL3DL, J0TL5, J0TL6, J0TL9, J0TM1, J0TM2, J0TM3, J0TM4, J0TM5    |
| 2/28/03<br>(0848)<br>5972HP66 | benzaldehyde<br>phenol-d5 (DMC)                | 40<br>62        | J/None<br>None              | All associated samples were non-detects. None of the data were qualified. |

### Quantitation Limits - Acceptable

Target compounds that were detected at concentrations less than the contract required quantitation limit (CRQL) were qualified as estimated, "J". Detected compounds at concentrations over the calibration range were qualified as estimated, "J". All of the reported results were adjusted for sample amounts analyzed. The "E" and "D" qualifiers applied by the laboratory were crossed-out by the reviewer.

It is recommended that SIM data be used in place of the full scan data unless otherwise specified. It is recommended that data users should utilize the results selected by the reviewer where more than one analysis was performed on a single extract (i.e., SIM, dilution, re-analysis).

### Blanks

All blanks for the analyses were acceptable with the following exceptions:

| Blank  | Contaminant   | Associated Samples   |
|--------|---|--|
| SBLKPI | Full Scan - bis(2-ethylhexyl)phthalate<br>SIM - naphthalene, phenanthrene | J0TK7, J0TK8, J0TK9, J0TL0, J0TL1, J0TL2, J0TL3, J0TL3DL, J0TL4, J0TL6, J0TL7, J0TL8, J0TL9, J0TM0, J0TM1, J0TM2, J0TM3, J0TM4 |
| SBLKPS | phenanthrene  | J0TL5, J0TM5   |
| SBLKPY | Full Scan - bis(2-ethylhexyl)phthalate<br>SIM - Pyrene                    | J0TM6, J0TM6DL, J0TM7, J0TM8, J0TM8DL, J0TM9   |

Bis(2-ethylhexyl)phthalate detected in the samples at concentrations less than ten times the value in their associated blank(s) were qualified as non-detects, "U". Naphthalene, phenanthrene and pyrene detected in the samples at concentrations less than five times the value in their associated blank(s) were qualified as non-detects, "U". The "B" qualifiers applied by the laboratory were crossed out by the reviewer.

### Analytical Sequence - Acceptable

All of the standards, blanks, samples, and QC samples were analyzed in accordance with the SOW specified analytical sequence.

### Deuterated Monitoring Compounds (DMCs)

All of the SVOC DMC recoveries met or only slightly exceeded the applicable QC criteria with the following exceptions:

| DMC (Limits)                | Sample | Percent Recovery | Associated Compound Qualifiers<br>Detect/Non-detect |
|-----------------------------|--------|------------------|---|
| benzo(a)pyrene-d12 (54-120) | J0TL0  | 18               | J/UJ  |
|                             | J0TL8  | 17               | J/UJ  |

### Matrix Spike/Matrix Spike Duplicate (MS/MSD) - Acceptable

SVOC samples J0TK7 and J0TM9 were utilized for MS/MSD analyses. The criteria for frequency of analysis, recoveries and relative percent differences (RPDs) were met with the following exceptions:

Recoveries for N-nitroso-di-n-propylamine and acenaphthene in samples J0TM9MS/MSD were slightly low. None of the data were qualified on this basis.

### Internal Standards - Acceptable

The acceptance criteria for internal standards (IS) are  $\pm 30$  seconds for retention time (RT) shifts and -50% to +100% of the IS area as compared to the IS RT and area of the daily continuing calibration standard. All of the GC/MS analyses met the IS area and RT shift criteria.

### Compound Identification - Acceptable

All of the compounds detected in the GC/MS analyses were within the retention time windows, met the USEPA spectral matching criteria and were judged to be acceptable.

### Tentatively Identified Compounds

Peaks that were detected in the samples at areas  $> 10\%$  of the internal standards and were not part of the target compound lists were identified as tentatively identified compounds (TICs). TICs that were both found in the sample and in the associated method blank(s) were qualified as unusable, "R." Peaks that were identified as common laboratory contaminants, solvent preservatives, column bleed or aldol condensation products were qualified as unusable, "R". The rest of the peaks identified as TICs were qualified "NJ", tentatively identified at an estimated concentration.

### Laboratory Contact

The laboratory was not contacted for this review.

### Overall Assessment

The total number of data points was 1947. Seventy one (3.6%) were qualified as estimated due to values reported below the CRQL, values reported above the calibration range, calibrations and DMCs. Thirty seven (1.9%) were qualified as non-detected due to blank contamination.

All of the samples were analyzed in accordance with technical specifications outlined in the SOW. The data, as qualified, are acceptable and can be used for all purposes.

| Data Qualifiers |  |
|-----------------|--|
| U               | The analyte was not detected at or above the reported result.  |
| J               | The analyte was positively identified. The associated numerical result is an estimate.   |
| UJ              | The analyte was not detected at or above the reported estimated result. The associated numerical value is an estimate of the quantitation limit of the analyte in this sample. |
| R               | The data are unusable for all purposes.  |
| N               | There is evidence the analyte is present in this sample.   |
| JN              | There is evidence that the analyte is present. The associated numerical result is an estimate.   |



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 10  
1200 Sixth Avenue  
Seattle, Washington 98101

Ray  
END?


IN REPLY

REFER TO: OEA-095

March 26, 2003

MEMORANDUM

SUBJECT: Taylor Lumber and Treating, CLP Metals Analysis, Data  
Validation  
Case: 31431  
SDG: MJ0TL2

FROM:   
Laura Castrilli, Chemist  
Quality Assurance, Monitoring & Assessment Unit, OEA

TO: Loren McPhillips, Remedial Project Manager  
Office of Environmental Cleanup

CC: Bruce Woods, Region 10 CLP TPO  
Trish Larson, CH2M HILL  
Scott Echols, CH2M HILL

The following is a validation of ICP-AES and mercury analyses of nineteen water samples from the Taylor Lumber and Treating site. The analyses were performed following the USEPA Contract Laboratory Program Statement of Work for Inorganics Analysis Multi-media, Multi-concentration, ILM04.1. Analyses were conducted by Sentinel Inc., Huntsville, Alabama. This validation was conducted for the following samples:

|     |        |        |        |        |        |        |
|-----|--------|--------|--------|--------|--------|--------|
| TL0 | MJ0TL3 | MJ0TL6 | MJ0TL9 | MJ0TM2 | MJ0TM5 | MJ0TM9 |
| TL1 | MJ0TL4 | MJ0TL7 | MJ0TM0 | MJ0TM3 | MJ0TM7 |        |
| TL2 | MJ0TL5 | MJ0TL8 | MJ0TM1 | MJ0TM4 | MJ0TM8 |        |

Qualifications

Following comments refer to Sentinel's performance in meeting quality control specifications outlined in the CLP Statement of Work (SOW) for Inorganic Analysis, rev. ILM04.1. The comments presented herein are based on the information provided for the review.

Timeliness - Acceptable

Technical (40 CFR part 136) holding time from the date of collection for mercury in water is 28 days. The holding time for the remaining metals in water is 180 days. The samples were collected on 02/17/03 and 02/20/03. Mercury analyses were completed on 03/03. ICP-AES analyses were completed on 02/26/03. All analyses

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were conducted within the technical water holding times, therefore no qualification was made based on holding time.

## **2.0 Sample Preparation - Acceptable**

The samples were prepared for ICP-AES and mercury analyses on 02/25/03. No qualification was made based on sample preparation.

## **3.0 Calibrations/Calibration Verifications - Acceptable**

The samples were analyzed for mercury by CVAAS on 02/25/03. The initial calibration included one blank and six standards. The curve was linear with a correlation coefficient greater than 0.995.

The samples were analyzed by ICP-AES on 02/26/03. The instrument was standardized each day of analysis according to the analytical method using one blank and one calibration standard for each element.

All ICP-AES and CVAAS (mercury) calibrations were performed as required and met the acceptance criteria; therefore, no qualification was made on this basis.

Calibration verification samples are required before and after sample analysis and after every 10 samples during analysis. Mercury recoveries must be within 80-120%. Other metal recoveries must be within 90-110%.

All ICP-AES and CVAAS (mercury) calibration verification (initial and continuing) samples bracketing reported sample results met the frequency and recovery criteria; therefore no qualification was made based on ICP-AES or CVAAS calibration verification.

## **4.0 Laboratory Control Samples - Acceptable**

Laboratory Control samples (LCS) are digested and analyzed along with the samples to verify the efficiency of laboratory procedures. All recoveries associated with reported sample results met the acceptance criteria for control samples; therefore no qualification was made on this basis.

## **5.0 Blanks -**

Procedural blanks were prepared with the samples to show potential contamination from the digestion or analytical procedure. If an analyte was found in the associated blank, the sample results were qualified if the analyte concentration was less than five times the analytical value in the blank.

Aluminum, barium, calcium, copper, iron, magnesium, and manganese were detected in the preparation blank. Nickle in the preparation blank

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had a negative result with an absolute value greater than the instrumental detection limit (IDL). Aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, copper, iron, magnesium, manganese, thallium, and vanadium were detected in one or more continuing calibration blanks (CCB). Aluminum and magnesium in several CCBs had negative results with absolute values greater than the IDLs.

Based on blank contamination, the following qualifications were made:

- ♦ Aluminum in samples MJ0TK9 and MJ0TL6 was qualified 'U', undetected. Aluminum in samples MJ0TK7, MJ0TK8, MJ0TL1 through MJ0TL5, MJ0TL9, and MJ0TM0 through MJ0TM4 was qualified 'UJ', estimated detection limit.
- ♦ Beryllium in sample MJ0TL2 was qualified 'U', undetected.
- ♦ Copper in samples MJ0TK7 through MJ0TK9, MJ0TL0 through MJ0TL3, MJ0TL6 through MJ0TL9, and MJ0TM0 through MJ0TM4 was qualified 'U', undetected.
- ♦ Iron in samples MJ0TK7, MJ0TK8, MJ0TL3, MJ0TL4, MJ0TL6, MJ0TM2, and MJ0TM3 was qualified 'U', undetected.
- ♦ Vanadium in samples MJ0TK8, MJ0TK9, MJ0TL1, MJ0TL5, MJ0TL7, and MJ0TM2 through MJ0TM4 was qualified 'U', undetected.

The remaining sample results were greater than five times the associated blank levels (or were already undetected) and were not qualified on this basis.

#### 6.0 ICP-AES Interference Check Sample - Acceptable

The interference check sample (ICS) is analyzed by ICP-AES to verify interelement and background correction factors. Analysis is required at the beginning and end of each sample analysis run and recoveries must be between 80% and 120%. All ICS-AB recoveries associated with reported sample results were within the recovery criteria. The ICS-A recoveries for chromium were high, but no analytes that interfere with chromium were at interfering levels.

There was a sample with an interfering level of calcium, however the estimated interference due to high calcium was negligible. Therefore no qualification was made based on suspected interference.

#### 7.0 Duplicate Analysis - Acceptable

Duplicate analysis was done on sample MJ0TL2. Water duplicate results were within the  $\pm 20\%$  Relative Percent Difference (RPD) or  $\pm \text{CRDL}$  criteria for water results  $< 5$  times the CRDL criteria; therefore no qualification was made on this basis.



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## 8.0 Matrix Spike Analysis - Acceptable

Matrix spike sample analyses are done to provide information about the effect of the sample matrix on digestion and measurement methods. Matrix spike recovery must be within the limits of 75 - 125%.

Matrix spike analysis was done on sample MJ0TL2. All matrix spike recoveries were within the required QC limits, therefore no qualification was made based on matrix spike recovery.

## 9.0 ICP-AES Serial Dilution - Acceptable

Sample MJ0TL2 was analyzed by ICP-AES serial dilution to check for potential interferences. All of the analytes which exceeded the minimum concentration criterion (50 times the IDL) were within the 10%D criteria; therefore no qualification was made based on serial dilution.

## 10.0 Detection Limits - Acceptable

Sample results which fall below the instrument detection limit (IDL) are assigned the value of the instrument detection limit and the 'U' qualifier is attached.

Contract Required Detection Limit (CRDL) standards are required for most analytes to demonstrate a linear calibration curve near the CRDL. CRDL standards were run at the required frequency. Data user note: results below the CRDL but above the IDL have a laboratory concentration qualifier of 'B' in the C column of the Form 1.

## 11.0 Overall Assessment of the Data

This validation of the data is based on the criteria outlined in the *National Functional Guidelines for Inorganic Data Review (02/94)*.

There were 437 data points reported: 66 results were qualified due to blank contamination. Overall, 15 percent of the data was qualified.

Below are the definitions for the National Functional Guidelines for Inorganic Data Review (02/94) qualifiers used when validating/qualifying data from Inorganic analysis.

### DATA QUALIFIERS

- U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
- J - The associated value is an estimated quantity.

*March 26, 2003*

- R - The data are unusable. (Note: Analyte may or may not be present.)
- UJ - The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 10  
1200 Sixth Avenue  
Seattle, Washington 98101

ICP  
EDD


IN REPLY

REFER TO: OEA-095

March 31, 2003

MEMORANDUM

SUBJECT: Taylor Lumber and Treating, CLP Metals Analysis, Data  
Validation  
Case: 31431  
SDG: MJ0TL2

FROM:  Laura Castrilli, Chemist  
Quality Assurance, Monitoring & Assessment Unit, OEA

TO: Loren McPhillips, Remedial Project Manager  
Office of Environmental Cleanup

CC: Bruce Woods, Region 10 CLP TPO  
Trish Larson, CH2M HILL  
Scott Echols, CH2M HILL

The following is a validation of ICP-MS analyses (arsenic, lead, selenium and thallium only) of nineteen water samples from the Taylor Lumber and Treating site. The analyses were performed following the USEPA Contract Laboratory Program Statement of Work for Inorganics Analysis Multi-media, Multi-Concentration, ILM05.2. Analyses were conducted by Sentinel Inc., Huntsville, Alabama. This ICP-MS validation was conducted for the following samples:

|        |        |        |        |        |        |        |
|--------|--------|--------|--------|--------|--------|--------|
| MJ0TK7 | MJ0TL0 | MJ0TL3 | MJ0TL6 | MJ0TL9 | MJ0TM2 | MJ0TM5 |
| MJ0TK8 | MJ0TL1 | MJ0TL4 | MJ0TL7 | MJ0TM0 | MJ0TM3 |        |
| MJ0TK9 | MJ0TL2 | MJ0TL5 | MJ0TL8 | MJ0TM1 | MJ0TM4 |        |

**Data Qualifications**

The following comments refer to Sentinel's performance in meeting quality control specifications outlined in the CLP Statement of Work (CLP-SOW) for Inorganic Analysis, rev. ILM05.2 and the Functional Guidelines for Inorganic Data Review (July 2002); utilizing professional judgement of the reviewer. The comments presented herein are based on the information provided for the review.

**1.0 Timeliness - Acceptable**

The technical (40 CFR part 136) holding time from the date of collection for metals in water is 180 days. The samples were collected between 02/17/03 and 02/20/03. ICP-MS analyses were

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completed on 03/06/03. All analyses were conducted within the technical water holding times, therefore no qualification was made based on holding time.

## 2.0 Sample Preparation - Acceptable

The samples were prepared for ICP-MS analyses on 02/27/03. No qualification was made based on sample preparation.

## 3.0 ICP-MS Tune -

Prior to instrument calibrations, the tuning solution was analyzed the minimal 5 times. The mass calibrations were within 0.1 amu for each isotope in the tuning solution.

However, the peak width at 5% peak height exceeded the <0.75 functional guideline criteria for  $^9\text{Be}$  (0.77\*),  $^{59}\text{Co}$  (0.77\*),  $^{113}\text{In}$  (0.82\*),  $^{115}\text{In}$  (0.76\*),  $^{206}\text{Pb}$  (0.76\*),  $^{207}\text{Pb}$  (0.76\*), and  $^{208}\text{Pb}$  (0.76\*). In the professional judgement of EPA QA chemists, it was decided to use an upper limit of 0.825 for the peak width criteria. Since all of the peak widths were within this expanded criteria, no qualification was made based on the average peak width at 5% peak height. \*For both dates of ICP-MS analysis.

The %Relative Standard Deviation (RSD) for each tune mass were not all within the 5% acceptance criteria. The following tune masses had %RSD values >5%:  $^9\text{Be}$  (O.K. for the 03/05/03 analysis, 7% for the 03/06/03 analysis),  $^{206}\text{Pb}$  (13 and 30%, respectively),  $^{207}\text{Pb}$  (20 and 30%, respectively), and  $^{208}\text{Pb}$  (11 and 24%, respectively). This was confirmed by checking the raw uncorrected ICP-MS per mass data that was provided in addition to the corrected concentration data. The tune masses nearest the specific analyte masses were used for qualification consideration. Only lead and thallium have masses near the lead tune masses. All thallium and lead results were qualified 'J', estimated due to the poor tuning RSD's for the lead masses.

It was not possible to verify the measured mass and average peak widths reported on Form 14 (ICP-MS). The Region 10 TPO is hereby notified that apparently the instrument software patch that was to enable the lab to provide this information for future packages has not yet been installed or doesn't function as intended. Since the rest of the quality control data was mostly within criteria for lab control samples, internal standards, duplicate, matrix spike, serial dilution etc., no qualification was made based on the missing raw data.

## 4.0 Calibrations/Calibration Verifications - Acceptable

The samples were analyzed for arsenic, lead, and selenium on 03/05/03. The samples were analyzed for thallium on 03/06/03.

The instrument was standardized each day of analysis according to the analytical method using one blank and one calibration standard for

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each element after tuning the instrument.

All ICP-MS calibrations were performed as required and met the acceptance criteria; therefore, no qualification was made on this basis.

Calibration verification samples are required before and after sample analysis and after every 10 samples during analysis. Recoveries must be within 90-110%.

All ICP-MS calibration verification (initial and continuing) samples bracketing reported sample results met the frequency and recovery criteria; therefore no qualification was made based on ICP-MS calibration verification.

#### **4.0 Blanks -**

Procedural blanks were prepared with the samples to show potential contamination from the digestion or analytical procedure. If an analyte was found in the associated blank, the sample results were qualified if the analyte concentration was less than five times the analytical value in the blank.

Lead was detected in the preparation blank and in one continuing calibration blank (CCB). Thallium in one CCB had a negative result with an absolute value greater than the method detection limit (MDL). Based on blank contamination, the following qualifications were made:

- ♦ Lead results for samples MJ0TK7, MJ0TK9, MJ0TL6 through MJ0TL8, and MJ0TM5 were qualified 'U', undetected.
- ♦ Thallium results for samples MJ0TK7 through MJ0TK9, MJ0TL0, MJ0TL1, MJ0TL3, and MJ0TL6, MJ0TL9, MJ0TM0, and MJ0TM1 were qualified 'UJ', estimated detection limit.

The remaining sample results were greater than five times the associated blank levels (or were already not detected) and were not qualified on this basis.

#### **5.0 ICP-MS Interference Check Sample -**

The interference check sample (ICS) is analyzed by ICP-MS to verify interelement and background correction factors. Analysis is required at the beginning and end of each sample analysis run and recoveries must be between 80% and 120%. All ICS-AB recoveries for reported analytes were within the recovery criteria.

There were some high calcium levels. Thallium in 2/3 of the ICS-A analyses had negative results with absolute values greater than the MDL. Thallium results in samples MJ0TK7, MJ0TK8, MJ0TL2, MJ0TL4, MJ0TL9, and MJ0TM1 were qualified 'UJ', estimated based on suspected interference.

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## 6.0 Laboratory Control Samples - Acceptable

Laboratory Control samples (LCS) are digested and analyzed along with the samples to verify the efficiency of laboratory procedures. All recoveries associated with reported sample results met the acceptance criteria for control samples; therefore no qualification was made on this basis.

## 7.0 Duplicate Analysis - Acceptable

Duplicate analysis was done on sample MJ0TL2. Water duplicate results were within the  $\pm 20\%$  Relative Percent Difference (RPD) or  $\pm CRQL$  criteria for water results < 5 times the CRQL criteria; therefore no qualification was made on this basis.

## 8.0 Matrix Spike Analysis - Acceptable

Matrix spike sample analyses are done to provide information about the effect of the sample matrix on digestion and measurement methods. Matrix spike recovery must be within the limits of 75 - 125%.

Matrix spike analysis was done on sample MJ0TL2. All matrix spike recoveries were within the required QC limits, therefore no qualification was made based on matrix spike recovery.

## 9.0 ICP-MS Serial Dilution - Acceptable

Sample MJ0TL2 was analyzed by ICP-MS serial dilution to check for potential interferences. All of the analytes which exceeded the minimum concentration criterion (50 times the MDL) were within the 10%D criteria; therefore no qualification was made based on serial dilution.

## 10.0 ICP-MS Internal Standards -

The laboratory added 5-6 internal standards (IS) to each sample, blank, QC sample etc. A minimum of 3 is required, however, the three chosen are supposed to bracket the masses of the reported analytes, which they did for this SDG.

The relative (to the IS response in the calibration blank) percent recoveries for the ISs were all within the 60-125% acceptance criteria with the exception of  $^{209}\text{Bi}$  for all reported thallium sample results and for arsenic, selenium, and lead analyses for samples MJ0TL7 and MJ0TL8. Lead was qualified 'J', estimated in samples MJ0TL7 and MJ0TL8. Thallium in all samples was qualified 'UJ', estimated detection limit. Arsenic and selenium were not qualified based on IS recoveries as the ISs associated with arsenic and selenium had acceptable recoveries.

The SOW requires that a CCB be immediately re-analyzed after a sample with poor IS recovery and if the IS recovery is in, the sample must be

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analyzed at a 1:2 dilution. If the IS recovery is out on the re-analysis of the CCB, analyses are to be stopped, the problem corrected, the instrument re-calibrated/verified and affected samples are to be re-analyzed. This was not done for this SDG.

A number of CCV, CCB, CRI, and/or ICS analyses had internal standard recoveries outside the acceptance range for  $^{115}\text{In}$ ,  $^{159}\text{Tb}$  or  $^{209}\text{Bi}$ . Since the results of these instrument QC analyses were within the various acceptance ranges, no sample results were qualified based on poor internal standard recovery for instrument QC samples.

#### **11.0 Detection Limits -**

With the exception of lead in samples MJ0TK8 and MJ0TM3, sample results which fall below the method detection limit (MDL) are assigned the value of the CRQL and the 'U' qualifier is attached. The raw data for samples MJ0TK8 and MJ0TM3 indicates that lead was not detected, yet results were reported as detects. 'U', undetected, qualifiers were attached to the lead results for samples MJ0TK8 and MJ0TM3. For data users' convenience, the MDLs for this SDG have been attached.

Contract Required Quantitation Limit (CRQL) standards are required for most analytes to demonstrate a linear calibration curve near the CRQL. CRQL standards were run at the required frequency. The new SOW requires that CRQL standards be re-analyzed if the recovery criteria have not been met and if they are still not met, the instrument has to be re-calibrated and affected samples/analytes have to be re-analyzed. All CRQL results were within the general 70-130% recovery criteria.

#### **12.0 Overall Assessment of the Data**

For ILM05.2, the laboratory is required to flag all detected results below the CRQL with a 'J' concentration qualifier (result below the CRQL but above the MDL).

Also new with ILM05.2, a laboratory 'D' qualifier in the qualification column indicates that a result is reported from a dilution analysis.

Electronic data users should note that CADRE 'R' qualifies undetected results when internal standard recovery is not within the acceptance criteria. In the reviewer's judgement, the results only warranted 'J' qualification.

There were 76 data points reported: 38 results were qualified due to tuning %RSD, 16 results were qualified due to blank contamination, 6 results were qualified based on suspected interference, 2 detected results were qualified undetected due raw instrument results being below the MDL, and 21 results were qualified based on internal standard recovery. Overall, 50 percent of the data was qualified (counting one qualification per analyte).

Below are the definitions for the National Functional Guidelines for

*March 31, 2003*

Inorganic Data Review (07/02) qualifiers used when validating/qualifying data from Inorganic analysis.

DATA QUALIFIERS

- U - The material was analyzed for, but was not detected above the level of the reported sample quantitation limit.
- J - The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
- J+ - The result is an estimated quantity, but the result may be biased high.
- J- - The result is an estimated quantity, but the result may be biased low.
- R - The data are unusable. The sample results are rejected due to serious deficiencies in meeting QC criteria. The analyte may or may not be present in the sample.
- UJ - The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.





UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 10

1200 Sixth Avenue  
Seattle, Washington 98101


IN REPLY

REFER TO: OEA-095

June 26, 2003

MEMORANDUM

SUBJECT: Taylor Lumber and Treating, CLP Metals Analysis, Data  
Validation  
Case: 31687  
SDG: MJ0WZ3

FROM:   
Laura Castrilli, Chemist  
Quality Assurance, Monitoring & Assessment Unit, OEA

TO: Loren McPhillips, Remedial Project Manager  
Office of Environmental Cleanup

CC: Bruce Woods, Region 10 CLP TPO  
Trish Larson, CH2M HILL  
Scott Echols, CH2M HILL

The following is a validation of ICP-AES and mercury analyses of five water samples from the Taylor Lumber and Treating site. The analyses were performed following the USEPA Contract Laboratory Program Statement of Work for Inorganics Analysis Multi-media, Multi-Concentration, ILM04.1. Analyses were conducted by Compuchem/Liberty, Cary, North Carolina. This validation was conducted for the following samples:

MJ0WZ3 MJ0X03 MJ0X04 MJ0X07 MJ0X08

**Data Qualifications**

The following comments refer to Compuchem's performance in meeting quality control specifications outlined in the CLP Statement of Work (CLP-SOW) for Inorganic Analysis, rev. ILM04.1. The comments presented herein are based on the information provided for the review.

**1.0 Timeliness - Acceptable**

The technical (40 CFR part 136) holding time from the date of collection for mercury in water is 28 days. The holding time for the remaining metals in water is 180 days. The samples were collected on 05/16. Mercury and ICP-AES analyses were completed on 05/27/03. All analyses were conducted within the technical water holding times, therefore no qualification was made based on holding time.

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detected in one or more continuing calibration blanks (CCB). Aluminum, calcium, sodium, and zinc in one or more CCBs had negative results with absolute values greater than the IDLs.

Based on blank contamination, the following qualifications were made:

- ♦ Arsenic in samples MJ0WZ3 and MJ0X07 was qualified 'U', undetected.
- ♦ Aluminum in all samples except MJ0X08 was qualified 'J', estimated or 'UJ', estimated detection limit.
- ♦ Beryllium in all samples was qualified 'UJ', estimated detection limit.
- ♦ Cadmium in sample MJ0X03 was qualified 'U', undetected.
- ♦ Copper in samples MJ0X03, MJ0X04, and MJ0X08 was qualified 'U', undetected.
- ♦ Selenium in all samples was qualified 'U', undetected.
- ♦ Thallium in samples MJ0WZ3 and MJ0X03 was qualified 'U', undetected.
- ♦ Zinc in all samples was qualified 'UJ', estimated detection limit.

The remaining sample results were greater than five times the associated blank levels (or were already undetected) and were not qualified on this basis.

#### **6.0 ICP-AES Interference Check Sample - Acceptable**

The interference check sample (ICS) is analyzed by ICP-AES to verify interelement and background correction factors. Analysis is required at the beginning and end of each sample analysis run and recoveries must be between 80% and 120%. All ICS recoveries associated with reported sample results were within the recovery criteria. None of the samples had interfering levels of analytes, therefore no qualification was made based on suspected interference.

#### **7.0 Duplicate Analysis - Acceptable**

Duplicate analysis was done on sample MJ0WZ3. Water duplicate results were within the  $\pm 20\%$  Relative Percent Difference (RPD) or  $\pm \text{CRDL}$  criteria for water results  $< 5$  times the CRDL criteria; therefore no qualification was made on this basis.

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## **2.0 Sample Preparation - Acceptable**

The samples were prepared for ICP-AES and mercury analyses on 05/23/03. No qualification was made based on sample preparation.

## **3.0 Calibrations/Calibration Verifications - Acceptable**

The samples were analyzed for mercury by CVAAS on 05/27/03. The initial calibration included one blank and five standards. The curve was linear with a correlation coefficient greater than 0.995.

The samples were analyzed by ICP-AES on 05/27/03. The instrument was standardized each day of analysis according to the analytical method using one blank and one calibration standard for each element.

All ICP-AES and CVAAS (mercury) calibrations were performed as required and met the acceptance criteria; therefore, no qualification was made on this basis.

Calibration verification samples are required before and after sample analysis and after every 10 samples during analysis. Mercury recoveries must be within 80-120%. Other metal recoveries must be within 90-110%.

All ICP-AES and CVAAS (mercury) calibration verification (initial and continuing) samples bracketing reported sample results met the frequency and recovery criteria; therefore no qualification was made based on ICP-AES or CVAAS calibration verification.

## **4.0 Laboratory Control Samples - Acceptable**

Laboratory Control samples (LCS) are digested and analyzed along with the samples to verify the efficiency of laboratory procedures. All recoveries associated with reported sample results met the acceptance criteria for control samples; therefore no qualification was made on this basis.

## **5.0 Blanks -**

Procedural blanks were prepared with the samples to show potential contamination from the digestion or analytical procedure. If an analyte was found in the associated blank, the sample results were qualified if the analyte concentration was less than five times the analytical value in the blank.

Cadmium, copper, iron, manganese, selenium, and thallium were detected in the preparation blank. Aluminum, beryllium, calcium, and zinc in the preparation blank had negative results with absolute values greater than the instrumental detection limit (IDL). Arsenic, barium, cadmium, copper, magnesium, manganese, selenium, and thallium were

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## 8.0 Matrix Spike Analysis - Acceptable

Matrix spike sample analyses are done to provide information about the effect of the sample matrix on digestion and measurement methods. Matrix spike recovery must be within the limits of 75 - 125%.

Matrix spike analysis was done on sample MJ0WZ3. All matrix spike recoveries were within the required QC limits, therefore no qualification was made on this basis.

## 9.0 ICP-AES Serial Dilution - Acceptable

Sample MJ0WZ3 was analyzed by ICP-AES serial dilution to check for potential interferences. All of the analytes which exceeded the minimum concentration criterion (50 times the IDL) were within the 10%D criteria; therefore no qualification was made based on serial dilution.

## 10.0 Detection Limits - Acceptable

Sample results which fall below the instrument detection limit (IDL) are assigned the value of the instrument detection limit and the 'U' qualifier is attached.

Contract Required Detection Limit (CRDL) standards are required for most analytes to demonstrate a linear calibration curve near the CRDL. CRDL standards were run at the required frequency. Data user note: results below the CRDL but above the IDL have a laboratory concentration qualifier of 'B' in the C column of the Form 1.

## 11.0 Overall Assessment of the Data

This validation of the data is based on the criteria outlined in the *National Functional Guidelines for Inorganic Data Review (02/94)*.

There were 115 data points reported: 27 results were qualified due to blank contamination. Overall, 23 percent of the data was qualified.

Below are the definitions for the National Functional Guidelines for Inorganic Data Review (02/94) qualifiers used when validating/qualifying data from Inorganic analysis.

### DATA QUALIFIERS

- U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
- J - The associated value is an estimated quantity.

*June 26, 2003*

- R - The data are unusable. (Note: Analyte may or may not be present.)
- UJ - The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

## U. S. EPA - CLP

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## INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJOWZ3

Lab Name: COMPUCHEMContract: 68W00082Lab Code: LIBRTYCase No.: 31687

SAS No.: \_\_\_\_\_

SDG No.: MJOWZ3Matrix (soil/water): WATERLab Sample ID: MJOWZ3-1Level (low/med): LOWDate Received: 05/20/03% Solids: 0.0Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No.   | Analyte   | Concentration | C | Q | M  |
|-----------|-----------|---------------|---|---|----|
| 7429-90-5 | Aluminum  | 40.9          | U | J | P  |
| 7440-36-0 | Antimony  | 4.7           | B |   | P  |
| 7440-38-2 | Arsenic   | 2.2           | B | U | P  |
| 7440-39-3 | Barium    | 49.4          | B |   | P  |
| 7440-41-7 | Beryllium | 0.20          | U | J | P  |
| 7440-43-9 | Cadmium   | 0.20          | U |   | P  |
| 7440-70-2 | Calcium   | 95400         |   |   | P  |
| 7440-47-3 | Chromium  | 0.60          | U |   | P  |
| 7440-48-4 | Cobalt    | 4.1           | B |   | P  |
| 7440-50-8 | Copper    | 1.6           | U |   | P  |
| 7439-89-6 | Iron      | 221           |   |   | P  |
| 7439-92-1 | Lead      | 1.4           | U |   | P  |
| 7439-95-4 | Magnesium | 41800         |   |   | P  |
| 7439-96-5 | Manganese | 1730          |   |   | P  |
| 7439-97-6 | Mercury   | 0.10          | U |   | CV |
| 7440-02-0 | Nickel    | 3.3           | B |   | P  |
| 7440-09-7 | Potassium | 454           | B |   | P  |
| 7782-49-2 | Selenium  | 2.7           | B | U | P  |
| 7440-22-4 | Silver    | 0.90          | U |   | P  |
| 7440-23-5 | Sodium    | 75600         |   |   | P  |
| 7440-28-0 | Thallium  | 4.0           | B | U | P  |
| 7440-62-2 | Vanadium  | 2.5           | B |   | P  |
| 7440-66-6 | Zinc      | 1.5           | U | J | P  |

06/05/03

Color Before: COLORLESSClarity Before: CLEAR

Texture: \_\_\_\_\_

Color After: COLORLESSClarity After: CLEAR

Artifacts: \_\_\_\_\_

Comments: \_\_\_\_\_

10

## U. S. EPA - CLP

1

## INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJ0X03

Lab Name: COMPUCHEMContract: 68W00082Lab Code: LIBRTYCase No.: 31687

SAS No.: \_\_\_\_\_

SDG No.: MJ0WZ3Matrix (soil/water): WATERLab Sample ID: MJ0WZ3-2Level (low/med): LOWDate Received: 05/20/03% Solids: 0.0Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No.   | Analyte   | Concentration | C | Q | M  |
|-----------|-----------|---------------|---|---|----|
| 7429-90-5 | Aluminum  | 217           |   | J | P  |
| 7440-36-0 | Antimony  | 2.5           | U |   | P  |
| 7440-38-2 | Arsenic   | 2.2           | U |   | P  |
| 7440-39-3 | Barium    | 139           | B |   | P  |
| 7440-41-7 | Beryllium | 0.20          | U | J | P  |
| 7440-43-9 | Cadmium   | 0.22          | B | U | P  |
| 7440-70-2 | Calcium   | 139000        |   |   | P  |
| 7440-47-3 | Chromium  | 0.60          | U |   | P  |
| 7440-48-4 | Cobalt    | 0.70          | U |   | P  |
| 7440-50-8 | Copper    | 2.0           | B | U | P  |
| 7439-89-6 | Iron      | 1060          |   |   | P  |
| 7439-92-1 | Lead      | 1.4           | U |   | P  |
| 7439-95-4 | Magnesium | 35200         |   |   | P  |
| 7439-96-5 | Manganese | 1340          |   |   | P  |
| 7439-97-6 | Mercury   | 0.10          | U |   | CV |
| 7440-02-0 | Nickel    | 1.8           | B |   | P  |
| 7440-09-7 | Potassium | 2420          | B |   | P  |
| 7782-49-2 | Selenium  | 4.8           | B | U | P  |
| 7440-22-4 | Silver    | 0.90          | U |   | P  |
| 7440-23-5 | Sodium    | 184000        |   |   | P  |
| 7440-28-0 | Thallium  | 4.5           | B | U | P  |
| 7440-62-2 | Vanadium  | 1.9           | B |   | P  |
| 7440-66-6 | Zinc      | 1.5           | U | J | P  |

11/06/25/03

Color Before: COLORLESSClarity Before: CLEAR

Texture: \_\_\_\_\_

Color After: COLORLESSClarity After: CLEAR

Artifacts: \_\_\_\_\_

Comments: \_\_\_\_\_

## U. S. EPA - CLP

1

## INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.:

MJ0X04

Lab Name: COMPUCHEMContract: 68W00082Lab Code: LIBRTYCase No.: 31687

SAS No.: \_\_\_\_\_

SDG No.: MJ0WZ3Matrix (soil/water): WATERLab Sample ID: MJ0WZ3-3Level (low/med): LOWDate Received: 05/20/03% Solids: 0.0Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No.   | Analyte   | Concentration | C | Q | M  |
|-----------|-----------|---------------|---|---|----|
| 7429-90-5 | Aluminum  | 40.9          | U | J | P  |
| 7440-36-0 | Antimony  | 2.5           | U |   | P  |
| 7440-38-2 | Arsenic   | 2.2           | U |   | P  |
| 7440-39-3 | Barium    | 35.4          | B |   | P  |
| 7440-41-7 | Beryllium | 0.20          | U | J | P  |
| 7440-43-9 | Cadmium   | 0.20          | U |   | P  |
| 7440-70-2 | Calcium   | 28600         |   |   | P  |
| 7440-47-3 | Chromium  | 0.60          | U |   | P  |
| 7440-48-4 | Cobalt    | 0.70          | U |   | P  |
| 7440-50-8 | Copper    | 2.8           | B | U | P  |
| 7439-89-6 | Iron      | 14.2          | U |   | P  |
| 7439-92-1 | Lead      | 1.4           | U |   | P  |
| 7439-95-4 | Magnesium | 12100         |   |   | P  |
| 7439-96-5 | Manganese | 361           |   |   | P  |
| 7439-97-6 | Mercury   | 0.10          | U |   | CV |
| 7440-02-0 | Nickel    | 4.2           | B |   | P  |
| 7440-09-7 | Potassium | 170           | B |   | P  |
| 7782-49-2 | Selenium  | 2.3           | B | U | P  |
| 7440-22-4 | Silver    | 0.90          | U |   | P  |
| 7440-23-5 | Sodium    | 37700         |   |   | P  |
| 7440-28-0 | Thallium  | 2.9           | U |   | P  |
| 7440-62-2 | Vanadium  | 0.81          | B |   | P  |
| 7440-66-6 | Zinc      | 1.5           | U | J | P  |

06/25/03

Color Before: COLORLESSClarity Before: CLEAR

Texture: \_\_\_\_\_

Color After: COLORLESSClarity After: CLEAR

Artifacts: \_\_\_\_\_

Comments: \_\_\_\_\_

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## U. S. EPA - CLP

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## INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJ0X07

Lab Name: COMPUCHEMContract: 68W00082Lab Code: LIBRTYCase No.: 31687

SAS No.: \_\_\_\_\_

SDG No.: MJ0WZ3Matrix (soil/water): WATERLab Sample ID: MJ0WZ3-4Level (low/med): LOWDate Received: 05/20/03% Solids: 0.0Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No.   | Analyte   | Concentration | C | Q | M  |
|-----------|-----------|---------------|---|---|----|
| 7429-90-5 | Aluminum  | 40.9          | U | J | P  |
| 7440-36-0 | Antimony  | 2.5           | U |   | P  |
| 7440-38-2 | Arsenic   | 2.2           | B | U | P  |
| 7440-39-3 | Barium    | 25.2          | B |   | P  |
| 7440-41-7 | Beryllium | 0.20          | U | J | P  |
| 7440-43-9 | Cadmium   | 0.20          | U |   | P  |
| 7440-70-2 | Calcium   | 56500         |   |   | P  |
| 7440-47-3 | Chromium  | 0.60          | U |   | P  |
| 7440-48-4 | Cobalt    | 0.70          | U |   | P  |
| 7440-50-8 | Copper    | 1.6           | U |   | P  |
| 7439-89-6 | Iron      | 274           |   |   | P  |
| 7439-92-1 | Lead      | 1.4           | U |   | P  |
| 7439-95-4 | Magnesium | 20700         |   |   | P  |
| 7439-96-5 | Manganese | 288           |   |   | P  |
| 7439-97-6 | Mercury   | 0.10          | U |   | CV |
| 7440-02-0 | Nickel    | 1.2           | U |   | P  |
| 7440-09-7 | Potassium | 441           | B |   | P  |
| 7782-49-2 | Selenium  | 2.6           | B | U | P  |
| 7440-22-4 | Silver    | 0.90          | U |   | P  |
| 7440-23-5 | Sodium    | 38200         |   |   | P  |
| 7440-28-0 | Thallium  | 2.9           | U |   | P  |
| 7440-62-2 | Vanadium  | 2.7           | B |   | P  |
| 7440-66-6 | Zinc      | 1.5           | U | J | P  |

06/24/03

Color Before: COLORLESS Clarity Before: CLEAR Texture: \_\_\_\_\_Color After: COLORLESS Clarity After: CLEAR Artifacts: \_\_\_\_\_

Comments: \_\_\_\_\_

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## U. S. EPA - CLP

1

## INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJ0X08

Lab Name: COMPUCHEMContract: 68W00082Lab Code: LIBRTYCase No.: 31687

SAS No.: \_\_\_\_\_

SDG No.: MJ0WZ3Matrix (soil/water): WATERLab Sample ID: MJ0WZ3-5Level (low/med): LOWDate Received: 05/20/03% Solids: 0.0Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No.   | Analyte   | Concentration | C | Q | M  |
|-----------|-----------|---------------|---|---|----|
| 7429-90-5 | Aluminum  | 818           |   |   | P  |
| 7440-36-0 | Antimony  | 2.5           | U |   | P  |
| 7440-38-2 | Arsenic   | 2.2           | U |   | P  |
| 7440-39-3 | Barium    | 8.5           | B |   | P  |
| 7440-41-7 | Beryllium | 0.20          | U | J | P  |
| 7440-43-9 | Cadmium   | 0.20          | U |   | P  |
| 7440-70-2 | Calcium   | 11000         |   |   | P  |
| 7440-47-3 | Chromium  | 1.1           | B |   | P  |
| 7440-48-4 | Cobalt    | 0.70          | U |   | P  |
| 7440-50-8 | Copper    | 5.9           | B | U | P  |
| 7439-89-6 | Iron      | 981           |   |   | P  |
| 7439-92-1 | Lead      | 1.4           | U |   | P  |
| 7439-95-4 | Magnesium | 4740          | B |   | P  |
| 7439-96-5 | Manganese | 42.7          |   |   | P  |
| 7439-97-6 | Mercury   | 0.10          | B |   | CV |
| 7440-02-0 | Nickel    | 1.5           | B |   | P  |
| 7440-09-7 | Potassium | 100           | B |   | P  |
| 7782-49-2 | Selenium  | 3.3           | B | U | P  |
| 7440-22-4 | Silver    | 0.90          | U |   | P  |
| 7440-23-5 | Sodium    | 11700         |   |   | P  |
| 7440-28-0 | Thallium  | 2.9           | U |   | P  |
| 7440-62-2 | Vanadium  | 3.1           | B |   | P  |
| 7440-66-6 | Zinc      | 1.5           | U | J | P  |

06/25/03

Color Before: COLORLESSClarity Before: CLEAR

Texture: \_\_\_\_\_

Color After: COLORLESSClarity After: CLEAR

Artifacts: \_\_\_\_\_

Comments: \_\_\_\_\_

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Appendix E-1  
Background Arsenic

## Background Arsenic in Soil in the Vicinity of the Taylor Lumber Site

PREPARED FOR: Robin Strauss  
PREPARED BY: Michael Niemet  
DATE: July 29, 2004

### Statistical Analysis

Data from all 1999-2000 soil samples in the TLT database were evaluated to estimate the background arsenic concentration. A total of 163 samples, from both the East and West facilities, were considered, and sample depths were treated equally. Arsenic concentrations were above the laboratory reporting limits in all cases.

A histogram was generated to show the frequency distribution with respect to concentration. The arsenic distribution (Figure 1) shows the majority of samples are normally distributed about a mean of 5 mg/kg, with a standard deviation of 2.2. Based on a coefficient of variation of 0.44, a characteristic bell-shaped curve centered at 5 mg/kg fits the distribution in the lower concentration range very well. This curve was fit to the lower concentration distribution only, and is not influenced by the high outliers. The presence of a well-defined normal distribution is strongly indicative of naturally occurring concentrations. The range of distribution is commensurate with typical levels of naturally occurring arsenic between 1 and 50 mg/kg, generally averaging 5 mg/kg, as reported by Lindsay (1979).

For normally distributed data, over 99.9 percent of the values will be contained within three standard deviations of the mean. Therefore, for the data shown under the Gaussian curve presented in Figure 1, arsenic concentrations in excess of approximately 12 mg/kg are outside the range that can be expected to occur normally for that distribution. A number of random high-outliers can be seen at concentrations greater than 12 mg/kg, indicating locations of probable arsenic contamination.

### Background Soil Data

Most of the data for the statistical analyses were from soil samples collected onsite. To verify the results, surface soil samples were collected from five locations away from the TLT facility, in areas believed to be generally unaffected by TLT operations, and analyzed for total arsenic to determine "background" arsenic concentrations in soil. The samples were collected in 2002. Sample locations are shown in the Remedial Investigation Report (Figure 4-6) and results are shown in Table 1. These concentrations are completely within the normal distribution shown in Figure 1, with a mean concentration of 6.5 mg/kg.

Figure 2 shows a histogram for all offsite surface soil samples through 2002, including residences that are not adjacent to the wood treating facility. The mean and standard

deviation of these 23 data points are 6.8 and 1.9, respectively, yielding a mean plus three standard deviations of 12.5 mg/kg.

## Conclusions

The industrial PRG of 1.6 mg/kg for arsenic was exceeded by over 95 percent of the samples overall between 1999-2002, excluding the Year 2000 arsenic field-screening data. As a result of this analysis, it is recommended that concentrations at or below 12 mg/kg be considered to be within the range of typical background concentrations in the area. Concentrations in excess of 12 mg/kg are likely a result of contamination from anthropogenic sources.

## References

Lindsay, W. *Chemical Equilibria in Soils*. John Wiley & Sons, New York, 1979.

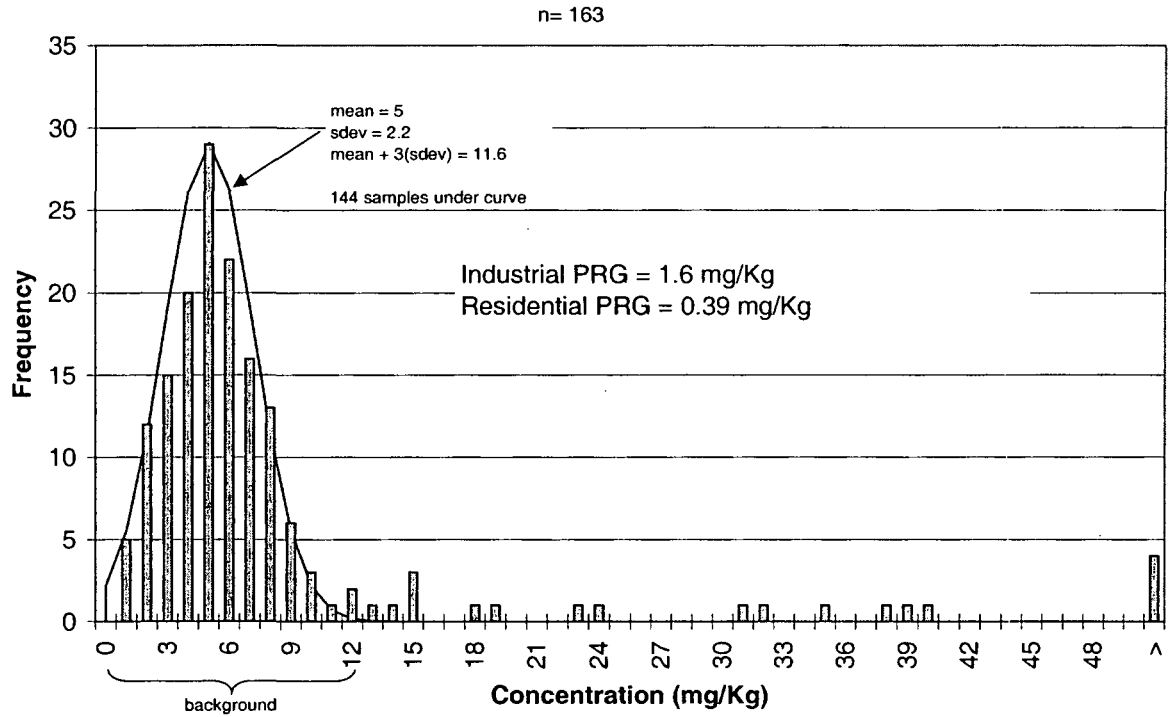
**TABLE E-1**  
Arsenic Concentrations in Background Soil Samples  
*Taylor Lumber and Treating Superfund Site*

| Res<br>PRG | Ind<br>PRG | units | BKG-1 |   | BKG-2 |   | BKG-03 |   | BKG-03 |   | BKG-04 |   | BKG-05 |   |
|------------|------------|-------|-------|---|-------|---|--------|---|--------|---|--------|---|--------|---|
| 0.39       | 1.6        | mg/kg | 6.9   | J | 2.4   | J | 7.9    | J | 6.2    | J | 8.5    | J | 7.0    | J |

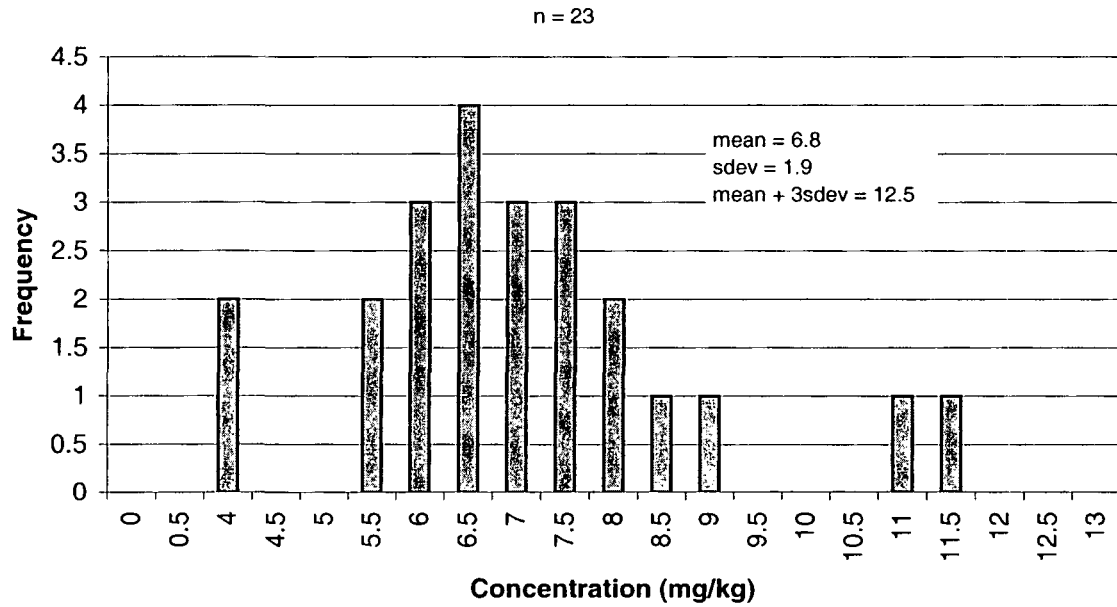
### Qualifiers

J: The analyte was positively identified. The associated numerical result is an estimate.

**Figure 1. Arsenic histogram for soil borings (all depths).**



**Figure 2. Arsenic Histogram for Offsite Surface Soil Samples**



Appendix E-2  
Storage Cell Volume



## Soil Storage Cell Volume Estimates

PREPARED FOR: Robin Strauss

PREPARED BY: Justin Iverson  
Michael Niemet

DATE: October 17, 2003

The contaminated soil storage cells were measured on Thursday, April 3, 2003. The perimeter of each of the three cells was measured with a 200' fiberglass tape. Measurements were made along the approximate top of the clean fill cell containment berm, and generally coincided with the edge of the black plastic cover and/or metal fence posts driven into the top of the berm. The declination of the measurement line was taken at the time of measurement.

The height of the cells was measured by means of sighting a level line from a point on the top of a cell to a stadia rod placed at natural ground level. One height measurement was collected at Cell #1 where the cell surface was approximately level. Several height measurements were taken along transects across Cell #2 and Cell #3, which had uneven top surfaces.

The perimeter segment lengths and declinations were used to plot the dimensions of the waste pile to scale and calculate a closing error (0.95%, 0.91%, and 1.9% for Cell #1, #2, and #3 respectively). The volume of each contaminated soil cell was calculated either by multiplying the planer area of the contaminated soil cell by the height of the cell (if constant, i.e. Cell #1) or by integrating the cross sectional area of the waste cell along simplified geometries representing variable cell heights.

After calculating the total volume of the three contaminated soil cells, the theoretical volume of the containment berm (assuming a 45 degree angle of repose) was subtracted from the number to calculate the total volume of contaminated soil. Depending on whether or not the cells are separated from each other by interior berms, the estimated total volume of contaminated soil is between 18,000 and 18,300 cubic yards. Calculation sheets are attached.

Areas:  $\frac{1}{2} a b \sin C$  where  $\sin 90^\circ = 1$

$$ABH = \frac{1}{2} \times 126' \times 125' \times \sin 102^\circ$$

$$= 7703 \text{ ft}^2$$

$$ABD = \frac{1}{2} \times 126' \times 20'$$

$$= 1260 \text{ ft}^2$$

$$BGF = \frac{1}{2} \times 130' \times 40'$$

$$= 2600 \text{ ft}^2$$

$$BGH = \frac{1}{2} \times 130' \times 142'$$

$$= 9280 \text{ ft}^2$$

$$\text{Total Area} = 20,793 \text{ ft}^2$$

Vol. Assuming Flat top & bottom

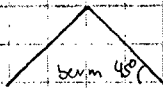
$$= 20,793 \text{ ft}^2 \times 7.5' = 155,947.5 \text{ ft}^3 \times \frac{1 \text{ yd}^3}{27 \text{ ft}^3} = 5775 \text{ yd}^3$$

Total Volume =

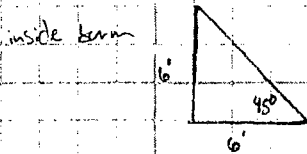
|                         |   |                         |   |                         |   |                         |
|-------------------------|---|-------------------------|---|-------------------------|---|-------------------------|
| Vol. Cell #1            | + | Vol. Cell #2            | + | Vol. Cell #3            | = | total                   |
| 155,947 ft <sup>3</sup> | + | 217,377 ft <sup>3</sup> | + | 144,433 ft <sup>3</sup> | = | 517,757 ft <sup>3</sup> |
| 5775 yd <sup>3</sup>    | + | 8051 yd <sup>3</sup>    | + | 5350 yd <sup>3</sup>    | = | 19,176 yd <sup>3</sup>  |

(assuming vertical sides and flat bottom)

Vol. Est. of inward sloping berm



estimate angle of repose  $\sim 45^\circ$



$$\text{x-sectional area} = \frac{1}{2} b h = \frac{1}{2} \times 6' \times 6' = 18 \text{ ft}^2$$

$$\text{est Vol} = 18 \text{ ft}^2 \times \text{perimeter}$$

aggregate perimeter if all 3 cells are individually enclosed: 1759 ft  
total perimeter of all 3 cells: 1285 ft

$$\text{Vol. of aggregate perimeter} = 1759 \text{ ft} \times 18 \text{ ft}^2 = 31,662 \text{ ft}^3 = 1,173 \text{ yd}^3$$

$$\text{Vol. of total perimeter} = 1285 \text{ ft} \times 18 \text{ ft}^2 = 23,130 \text{ ft}^3 = 857 \text{ yd}^3$$

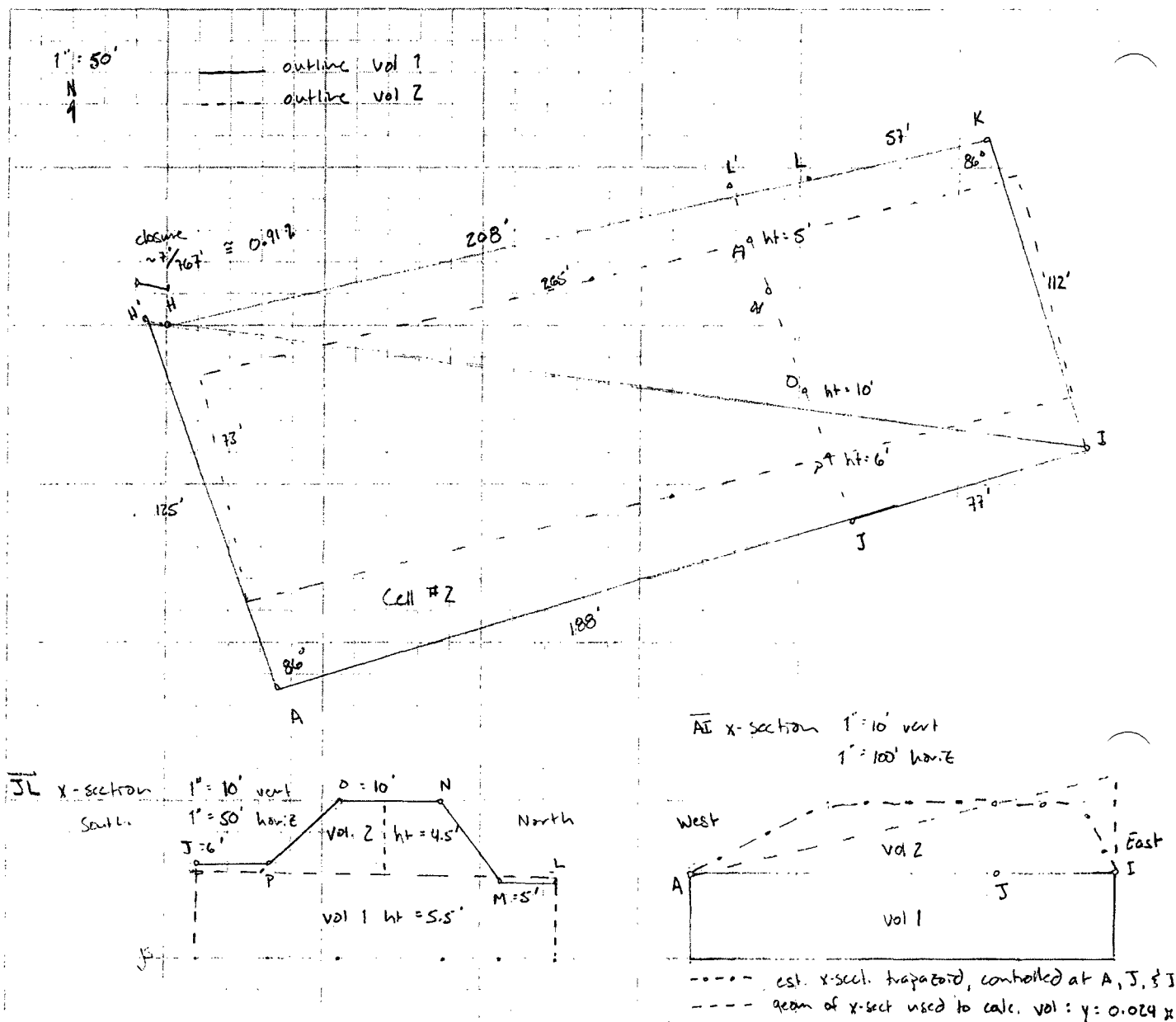
$$\text{Total Vol. assuming } 45^\circ \text{ bermed sides and flat bottom} = 18,000 + 18,320 \text{ yd}^3$$

TLT Waste Cell Vol. Est.

SHEET NO. 2 of DATE 4/4/03

Cell # 2

PROJECT NO. 165241. FI. 01

Area #1

$$A_{IH} = \frac{1}{2} \times 125' \times 265' \times \sin 86^\circ$$

$$= 16,522 \text{ ft}^2$$

$$K_{IH} = \frac{1}{2} \times 112' \times 265' \times \sin 86^\circ$$

$$= 14,804 \text{ ft}^2$$

$$\text{Total Area} = 31,326 \text{ ft}^2$$

$$\begin{aligned} \text{Vol \#1} &= 31,326 \text{ ft}^2 \times 5.5 \text{ ft} \\ &= 172,293 \text{ ft}^3 \times \frac{1 \text{ yd}^3}{27 \text{ ft}^3} \\ &= 6381 \text{ yd}^3 \end{aligned}$$

Area #2

x-s along JL

$$= \frac{1}{2} (b+t) h$$

$$= \frac{1}{2} \times (34' + 73') \times 4.5'$$

$$= 241 \text{ ft}^2$$

assume flat top

$$\text{rough vol.} = 241 \text{ ft}^2 \times 265 \text{ ft}$$

$$= 63,865 \text{ ft}^3$$

$$= 2365 \text{ yd}^3$$

(over-estimation)

x-s along any N-S line

$$= \frac{1}{2} (b+t) h(x), h(x) = 0.024x$$

[assume sloping (0.024) top]

$$= \frac{1}{2} (34' + 73') \times 0.024x$$

$$= 1.284x$$

$$\int_0^{265} 1.284x$$

$$= 1.284 \left[ \frac{x^2}{2} \right]_0^{265}$$

$$= 1.284 \text{ ft} \times 35'1125'$$

$$= 45,084.375$$

$$= 1,670 \text{ yd}^3$$

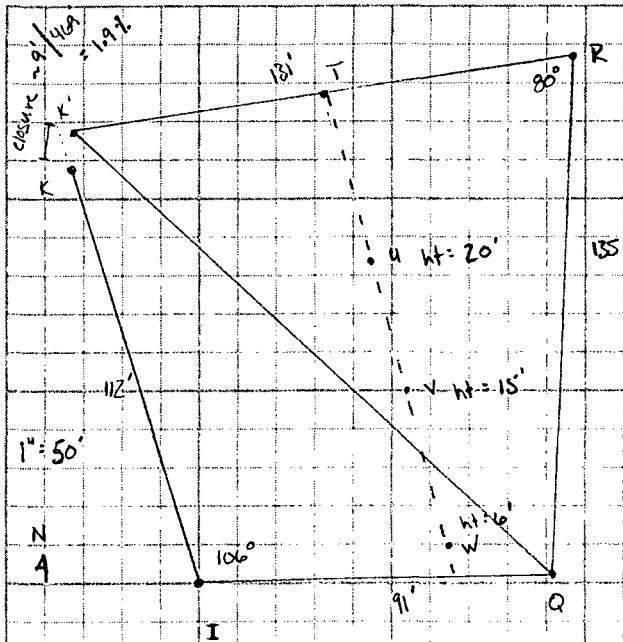
$$\text{Total vol} = 6381 \text{ yd}^3 + 1670 \text{ yd}^3 = 8051 \text{ yd}^3$$

TLT Waste Cell Vol. Est.

SHEET NO. 3 of DATE 4/4/03

Cell #3

PROJECT NO. 165241.FI.01



Area:

$$K'RQ = \frac{1}{2} \times 135' \times 131' \times \sin 80^\circ$$

$$= 8708 \text{ ft}^2$$

$$K'IQ = \frac{1}{2} \times 91' \times 112' \times \sin 106^\circ$$

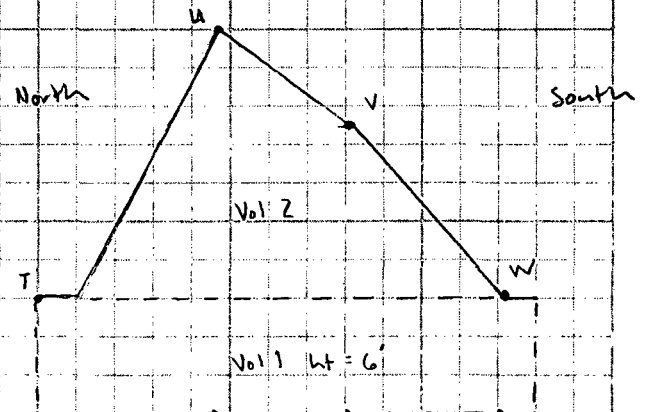
$$= 4898 \text{ ft}^2$$

$$\text{Total} = 13,606 \text{ ft}^2$$

TW X-Section

1" = 10' vert

1" = 80' horz



$$\text{Volume 1:} = 13,606 \text{ ft}^2 \times 6 \text{ ft}$$

$$= 81,639 \text{ ft}^3$$

$$\text{Volume 2: assume pyramid (4-sided)}$$

$$\text{assume base is square, 116 ft per side}$$

$$= 13,456 \text{ ft}^2$$

$$\text{assume pyramid comes to a point at } h = 14$$

$$h = 20' - 6', \text{ assume base of form is } h_0 = 0$$

$$\text{Vol} = \frac{L^2 h}{3} \quad (\text{from Stewart, p. 449})$$

$$= \frac{116^2 \times 14}{3} = 62,794 \text{ ft}^3$$

$$\text{Total Vol} = 81,639 \text{ ft}^3 + 62,794 \text{ ft}^3$$

$$= 144,433 \text{ ft}^3 + \frac{1 \text{ yd}^3}{27}$$

$$= 5350 \text{ yd}^3$$

Appendix E-3  
DNAPL Characterization

## Solubility of Constituents, Estimated Extent, and Expected Persistence of DNAPL at TLT

PREPARED FOR: Robin Strauss  
PREPARED BY: Michael Niemet  
COPIES: Randy Pratt  
DATE: September 29, 2003

In most cases, the installation of a monitoring well within an area impacted by dense non-aqueous phase liquid (DNAPL) does not result in DNAPL product being observed in the well. Some of the factors that dictate whether or not DNAPL will flow into a well under a natural hydraulic gradient include:

- The degree to which the media is saturated with DNAPL
- The ability of the DNAPL to form a continuous flow path to the well screen
- The chemical compatibility of the well screen with the DNAPL

Because of this, DNAPL can often be very difficult to positively identify in the subsurface. Often the presence of DNAPL can only be inferred by the presence of high concentrations in the groundwater, at or near the theoretical solubility limit of the particular constituent(s).

At the Taylor Lumber and Treating Superfund Site (TLT), previous soil borings and monitor well installations have indicated the presence of a large area of DNAPL impacted soil. However, only an occasional trace of DNAPL has been observed since groundwater monitoring has been reestablished as part of the Remedial Investigation in 2002. As a result, this memorandum serves to accomplish the following objectives:

1. Determine the theoretical aqueous solubilities of constituents in the DNAPL at TLT based upon previously obtained DNAPL samples.
2. Estimate the extent of DNAPL in the subsurface based on the observed aqueous concentrations as of September of 2002.
3. Evaluate the period of time which the DNAPL can be expected to persist in the subsurface at TLT.

### 1. Solubility of DNAPL Constituents

As with most DNAPL contamination at wood-treater sites, the DNAPL observed at TLT consists primarily of creosote. Creosote, which is derived from coal tar, is a complex mixture of hundreds of chemicals (85 percent PAHs) of which only a few are present in amounts of 1 percent or more. Since creosote is a mixture of chemicals, the effective solubilities of each of the constituents can be estimated by Raoult's law, which states that the effective solubility of a compound in a mixture is equal to its individual solubility times its mole fraction.

Determining the effective aqueous solubilities of the constituents in creosote is further complicated by the fact that many of the compounds exist as solids at room temperature in their pure state. The solubilities reported in the literature are measured by dissolution of the pure phase (solid) into water. However, in creosote these compounds exist in the liquid phase since they are dissolved into a carrier oil. On an individual basis, the relative solubilities of constituents in creosote will be greater than the reported values since no energy is required to overcome the phase change required for dissolution.

As part of the IA (E&E, 1999), the DNAPL product from monitor wells N-1D and N-2D was characterized. These data were used to estimate the effective solubilities for the detected constituents given the relative proportions of constituents observed in the DNAPL. The results are shown in Table 1. It was assumed that the carrier oil comprised 50 percent of the DNAPL on a molar basis (CH2M HILL, 1993). The relationship developed by Irmann (1965) was used to calculate the expected pure liquid phase solubilities of the constituents based on the solubilities and melting points of the pure solid phases obtained from Montgomery (1991).

As shown in Table 1, the estimated solubilities of creosote constituents correlate well with the groundwater concentrations observed in MW-101S, N-1D, and N-2D. DNAPL had been observed in all three of these wells at some time previously. Naphthalene represents the most prevalent constituent in the creosote and has the greatest expected aqueous solubility (19.7 mg/L). For the compounds with very low effective solubilities ( $< 0.01$  mg/L), the observed concentrations were much higher than predicted. This is likely due to the capture of very small globules of NAPL, or a small amount of sediment, in the groundwater sample. For the more soluble compounds the mass contribution from these phases is negligible, but is dominant for the compounds with very low solubilities.

It has been observed that the presence of DNAPL in the vicinity of a well can be inferred from the observed aqueous concentrations. Saturation percentages in groundwater as low as 1 percent of the effective solubility have been used as an indication of the likely presence of DNAPL at a field site (Feenstra et al., 1991). Based on the August/September 2002 groundwater results, the area delineated by naphthalene concentrations at or above 0.197 mg/L (1 percent of the solubility) corresponded well to where NAPL was observed in both the RFI and IA (Figure 1).

## 2. Estimated DNAPL Extent

DNAPL impacted soil was observed in the RFI (MFA, 1997) and IA (E&E, 1999). The observed DNAPL zones were similar in these studies and are depicted on Figure 1. The IA estimated that DNAPL resided over an area of approximately 125,000 ft<sup>2</sup> (2.9 acres) with an average thickness of 4 feet (E&E, 1999), resulting in a volume of impacted soil of approximately 18,500 cubic yards. The volume of DNAPL present in the subsurface depends on the extent to which the affected soil is saturated with DNAPL. If the impacted zone were completely saturated with DNAPL, it would represent the presence of about 1.3 million gallons of DNAPL. However, this is likely to be a gross over-estimate, since the DNAPL will be present over a wide saturation range.

The most highly saturated areas of DNAPL contamination are expected to occur above the lower confining layer (siltstone), since DNAPL tends to sink as a result of its higher specific

gravity than that of water. Monitor wells installed for the purpose of DNAPL observation (i.e., N-1D, N-2D, N-3D, and MW-101S) have not produced significant quantities of free product. Approximately 5 inches of DNAPL were observed in N-1D and N-2D during the RFI, which diminished to between 2 and 4 inches in the IA. No more than a trace of DNAPL has been observed in these wells over the last 6 quarters of groundwater monitoring.

The presence of copious DNAPL was recently confirmed during the Phase 2 Field Investigation when the original 2-inch PVC well at MW-101S was overdrilled and replaced with a 4-inch stainless steel well (CH2M HILL, Memo: August 8, 2002). An oil/water emulsion was observed while developing the stainless well. However, during the August/September 2002 sampling event DNAPL was not observed.

Based on the apparent correlation between groundwater concentration and the presence of DNAPL, a more realistic estimate of the total quantity of DNAPL was determined. It was assumed that the DNAPL saturation in the surrounding porespace was approximately equal to the ratio of the naphthalene concentration in the groundwater relative to its effective solubility limit. Approximate contour intervals at 1, 10, and 100 percent of saturation were established (Figure 1). The areas of each saturation interval were determined graphically, and the volume of DNAPL was calculated based on the sum of the average saturations in each interval. An average impacted zone thickness of 4 feet and a porosity of 35 percent were used for all intervals. The total volume of DNAPL present was estimated to be approximately 250,000 gallons, or about 19 percent of the 1.3 million calculated based on the impacted area reported in the IA assuming 100 percent saturation.

Given the quantity of DNAPL estimated to be present in the subsurface, the lack of DNAPL mobility into the wells is not understood. This may be the result of unsaturated and/or immobile DNAPL in the surrounding matrix and filter pack, since DNAPL will not readily flow into a well without a series of interconnected flow-paths. Based on the groundwater results of August/September 2002, MW-101S is the only remaining monitor well with concentrations at the solubility limit (Figure 1). It is possible that aggressive pumping at MW-101S may establish the connected flow paths necessary for DNAPL to begin to freely enter the well. Pilot testing would be required before it could be determined if any significant portion of DNAPL can be removed from the subsurface by direct extraction.

### 3. DNAPL Persistence

Based on the estimated total DNAPL mass and the theoretical solubility limits of the DNAPL constituents, an evaluation of the period of time which the DNAPL can be expected to persist in the subsurface can be made. However, this is not a straightforward procedure, since the respective mole fractions and dissolution rates of each constituent continually change over time. The compounds with the highest effective solubilities will dissolve into the aqueous phase fastest initially. Over time, as the mole fraction of these constituents drop, other constituents will begin to appear in the aqueous phase at greater concentrations than initially observed. The result of this effect is that the DNAPL will not dissolve into the aqueous phase at a steady rate, and unexpected dynamics in the groundwater concentrations may occur.

A model was developed to investigate the dynamics of DNAPL dissolution and persistence at TLT. Based on the DNAPL chemistry and effective solubilities described in Table 1 as



initial conditions, groundwater concentrations were calculated forward in time over a series of discrete time steps. For each time step, the mass lost to the aqueous phase was determined from each constituent's solubility limit times the rate of groundwater flow through the DNAPL impacted zone. The mass lost to the aqueous phase was subtracted from the DNAPL source, and the resulting mole fractions and solubilities determined. This process was repeated for each time step until the DNAPL source was depleted.

Figure 2 shows the predicted groundwater concentration results that are based on the natural flux of groundwater through the DNAPL source before the installation of the barrier wall. Note the logarithmic concentration scale on the figure due to the large range of concentrations. Important parameters include a groundwater velocity of 0.082 ft/day, a cross sectional area of DNAPL source perpendicular to groundwater flow of 1000 ft<sup>2</sup>, a porosity of 0.35, and a DNAPL source volume of 250,000 gallons. These parameters result in a groundwater flow rate through the DNAPL impacted zone of approximately 0.15 gpm. Figure 3 shows these results normalized to EPA Region 9 Tapwater PRGs, for the constituents listed in the PRG tables. In this way, Figure 3 represents the hypothetical risk associated with the concentration levels given the exposure assumptions used in the development of the Tapwater PRGs.

The figures indicate that under these conditions the DNAPL will continue to be a contaminant source to the groundwater, at levels above the Tapwater PRGs, for nearly 16,000 years. As expected, the constituents with the greatest pure phase solubilities, naphthalene, pentachlorophenol, and carbazole, were the first to be removed. The concentrations of these compounds continually decreased until they were removed from the DNAPL source. The groundwater concentrations of all of the other compounds increased over time before eventually being removed. Generally, the constituents with the lowest solubilities peaked at the latest times.

The time that the DNAPL source will persist will be inversely proportional to the rate at which groundwater is passed through it. In other words, if the groundwater flow rate through the DNAPL source were increased by an order of magnitude from 0.15 to 1.5 gpm, by extraction wells or some other means, then the lifetime of the DNAPL source would be reduced from 16,000 to 1,600 years. Although the time for the DNAPL plume to diminish seems very long, these predictions are likely to underestimate the actual time due to the some of the underlying assumptions. First, it is unlikely that all of the groundwater flowing through the source zone will reach the solubility limits of all constituents. This is mainly because the entire DNAPL impacted zone is not saturated with DNAPL. Second, biodegradation of the source will not be a mechanism of removal. The DNAPL itself is highly toxic to microorganisms. Certain microorganisms are capable of degrading some of the constituents only after they have partitioned into the aqueous phase.

#### 4. References

CH2M HILL. *Remedial Investigation Report. Tie Treating Plant, The Dalles, Oregon*. Prepared for the Union Pacific Railroad Company. July 1993.

CH2M HILL. Memo: MW-101S Well Replacement. August 8, 2002.

Ecology & Environment, Inc. *Integrated Assessment Report: Taylor Lumber and Treating Site*. 1999.

Feenstra, S., D.M. Mackay, and J.A. Cherry. A Method for Assessing Residual NAPL Based on Organic Chemical Concentrations in Soil Samples. *Journal of Groundwater Monitoring Review* XI(2). 1991.

Irmann, F. A simple Correlation Between Water Solubility and Structure of Hydrocarbons and Halocarbons. *Chem. Eng. Tech.* 37:789-98. 1965.

Maul, Foster and Alongi, Inc. *Draft Phase 1 RCRA Facility Investigation Final Report: Taylor Lumber and Treating*. 1997.

Montgomery, J. *Groundwater Chemicals Field Guide*. Lewis Publishers. 1991.

TABLE 1

Determination of Aqueous Solubility Based on Detected Organics in DNAPL Samples  
Taylor Lumber and Treating, Sheridan, Oregon

|                      | Pure Solid             |                                    |                                   | Pure Liquid                       | DNAPL            |                  |             |                    |                    |                  | Mixture              |
|----------------------|------------------------|------------------------------------|-----------------------------------|-----------------------------------|------------------|------------------|-------------|--------------------|--------------------|------------------|----------------------|
|                      | Mol. Weight<br>(g/mol) | Melting<br>Point <sup>2</sup> (°C) | Solubility <sup>2</sup><br>(mg/L) | Solubility <sup>1</sup><br>(mg/L) | N1D-PR<br>(g/kg) | N2D-PR<br>(g/kg) | ratio       | N1D-PR<br>(mol/kg) | N2D-PR<br>(mol/kg) | Mole<br>Fraction | Solubility<br>(mg/L) |
| Acenaphthene         | 154.21                 | 89.9                               | 3.82E+00                          | 1.58E+01                          | 28               | 9                | 3.111111111 | 1.82E-01           | 5.84E-02           | 4.65E-02         | 7.34E-01             |
| Anthracene           | 178.24                 | 216.3                              | 4.30E-02                          | 2.82E+00                          | 4.4              | 1.6              | 2.75        | 2.47E-02           | 8.98E-03           | 6.74E-03         | 1.90E-02             |
| Benzo(a)anthracene   | 228.30                 | 158.5                              | 1.31E-02                          | 2.43E-01                          | 3.8              | 1.1              | 3.454545455 | 1.66E-02           | 4.82E-03           | 4.05E-03         | 9.84E-04             |
| Benzo(a)pyrene       | 252.32                 | 181.3                              | 3.80E-03                          | 1.16E-01                          | 1.2              | 0.44             | 2.727272727 | 4.76E-03           | 1.74E-03           | 1.30E-03         | 1.51E-04             |
| Benzo(b)fluoranthene | 252.32                 | 164.0                              | 1.20E-03                          | 2.51E-02                          | 3                | 1                | 3           | 1.19E-02           | 3.96E-03           | 3.10E-03         | 7.78E-05             |
| Benzo(k)fluoranthene | 252.32                 | 217.0                              | 5.50E-04                          | 3.67E-02                          | 0.57             | 0.26             | 2.192307692 | 2.26E-03           | 1.03E-03           | 7.00E-04         | 2.57E-05             |
| Carbazole            | 167.00                 | 244.0                              | 1.80E+00                          | 2.17E+02                          | 3                | 1                | 3           | 1.80E-02           | 5.99E-03           | 4.69E-03         | 1.02E+00             |
| Chrysene             | 228.30                 | 258.2                              | 3.90E-03                          | 6.40E-01                          | 3.4              | 1.2              | 2.833333333 | 1.49E-02           | 5.26E-03           | 4.00E-03         | 2.56E-03             |
| Dibenzofuran         | 168.20                 | 86.5                               | 1.00E+01                          | 3.84E+01                          | 22               | 7.2              | 3.055555556 | 1.31E-01           | 4.28E-02           | 3.38E-02         | 1.30E+00             |
| Fluoranthene         | 202.26                 | 107.0                              | 1.66E-01                          | 9.98E-01                          | 10               | 3.9              | 2.564102564 | 4.94E-02           | 1.93E-02           | 1.40E-02         | 1.40E-02             |
| Fluorene             | 166.22                 | 116.5                              | 1.69E+00                          | 1.25E+01                          | 24               | 8                | 3           | 1.44E-01           | 4.81E-02           | 3.77E-02         | 4.70E-01             |
| 2-Methylnaphthalene  | 142.20                 | 34.6                               | 2.46E+01                          | 3.03E+01                          | 56               | 17               | 3.294117647 | 3.94E-01           | 1.20E-01           | 9.81E-02         | 2.98E+00             |
| Naphthalene          | 128.18                 | 80.5                               | 3.00E+01                          | 1.01E+02                          | 99               | 31               | 3.193548387 | 7.72E-01           | 2.42E-01           | 1.95E-01         | 1.97E+01             |
| Pentachlorophenol    | 202.28                 | 182.5                              | 1.40E+01                          | 4.39E+02                          | 0.42             | U                |             | 2.08E-03           | 6.92E-04           | 5.42E-04         | 2.38E-01             |
| Phenanthrene         | 178.24                 | 100.5                              | 1.14E+00                          | 5.96E+00                          | 26               | 9.6              | 2.708333333 | 1.46E-01           | 5.39E-02           | 4.01E-02         | 2.39E-01             |
| Pyrene               | 202.26                 | 156.0                              | 1.35E-01                          | 2.37E+00                          | 6.8              | 2.6              | 2.615384615 | 3.36E-02           | 1.29E-02           | 9.42E-03         | 2.23E-02             |
| Sub Total            |                        |                                    |                                   |                                   |                  |                  |             | 1.95               | 0.63               | 0.5              |                      |
| Carrier Oil          |                        |                                    |                                   |                                   |                  |                  |             | 1.95               | 0.63               | 0.5              |                      |
| Total                |                        |                                    |                                   |                                   |                  |                  |             | 3.89               | 1.26               | 1                |                      |

<sup>1</sup>Based on the results of Irmann (1965):  $S_L = S_S \cdot 10^{0.0095(MP-25)}$

where:  $S_L$  = Solubility of the pure liquid

$S_S$  = Solubility of the pure solid

MP = Melting point (°C)

<sup>2</sup>From Montgomery (1991)

**TABLE 2**

Comparison of Theoretical Aqueous Solubility to Observed Concentrations at Selected Wells  
*Taylor Lumber and Treating, Sheridan, Oregon*

|  | <b>Solubility<br/>(mg/L)</b> | <b>MW-101S<br/>2002<sup>1</sup><br/>(mg/L)</b> | <b>N1D &amp; N2D<br/>1999<br/>(mg/L)</b> | <b>N1D &amp; N2D<br/>2002<sup>1</sup><br/>(mg/L)</b> |
|--|------------------------------|--|--|--|
| Acenaphthene                           | 0.734                        | 0.54   | 0.71 - 2.3                               | 0.26 - 0.48  |
| Anthracene                             | 0.0190                       | 0.5 U  | 0.027 - 0.24                             | 0.0088 - 0.5 U                                       |
| Benzo(a)anthracene                     | 0.000984                     | 0.0065   | 0.03 - 0.21                              | 0.0031 - 0.5 U                                       |
| Benzo(a)pyrene                         | 0.000151                     | 0.0023   | 0.008 - 0.065                            | 0.005 U - 0.5 U                                      |
| Benzo(b)fluoranthene                   | 7.78E-05                     | 0.0053   | 0.025 - 0.16                             | 0.0021 - 0.5 U                                       |
| Benzo(k)fluoranthene                   | 2.57E-05                     | 0.0017   | 0.005 - 0.067                            | 0.005 U - 0.5 U                                      |
| Carbazole                              | 1.02                         | NA   | 0.01 U - 0.37                            | NA   |
| Chrysene                               | 0.00256                      | 0.0073   | 0.026 - 0.18                             | 0.0035 - 0.5 U                                       |
| Dibenzofuran                           | 1.30                         | 0.34   | 0.44 - 1.2                               | 0.18 - 0.33  |
| Fluoranthene                           | 0.0140                       | 0.5 U  | 0.130 - 0.680                            | 0.016 - 0.5 U  |
| Fluorene                               | 0.470                        | 0.26   | 0.330 - 0.960                            | 0.16 - 0.25  |
| 2-Methylnaphthalene                    | 2.98                         | 1.9  | 1.4U - 4                                 | 0.42 - 1.5   |
| Naphthalene                            | 19.7                         | 20   | 4.7 - 13                                 | 0.99 - 12  |
| Pentachlorophenol                      | 0.238                        | 2.2  | 0.038 - 2.4                              | 0.0023 - 1.5   |
| Phenanthrene                           | 0.239                        | 0.17   | 0.28 - 1.5                               | 0.082 - 0.18   |
| Pyrene                                 | 0.0223                       | 0.5 U  | 0.063 - 0.38                             | 0.009 - 0.5 U  |
| <sup>1</sup> September 2002 data shown |                              |  |  |  |
| NA = Not Available                     |                              |  |  |  |

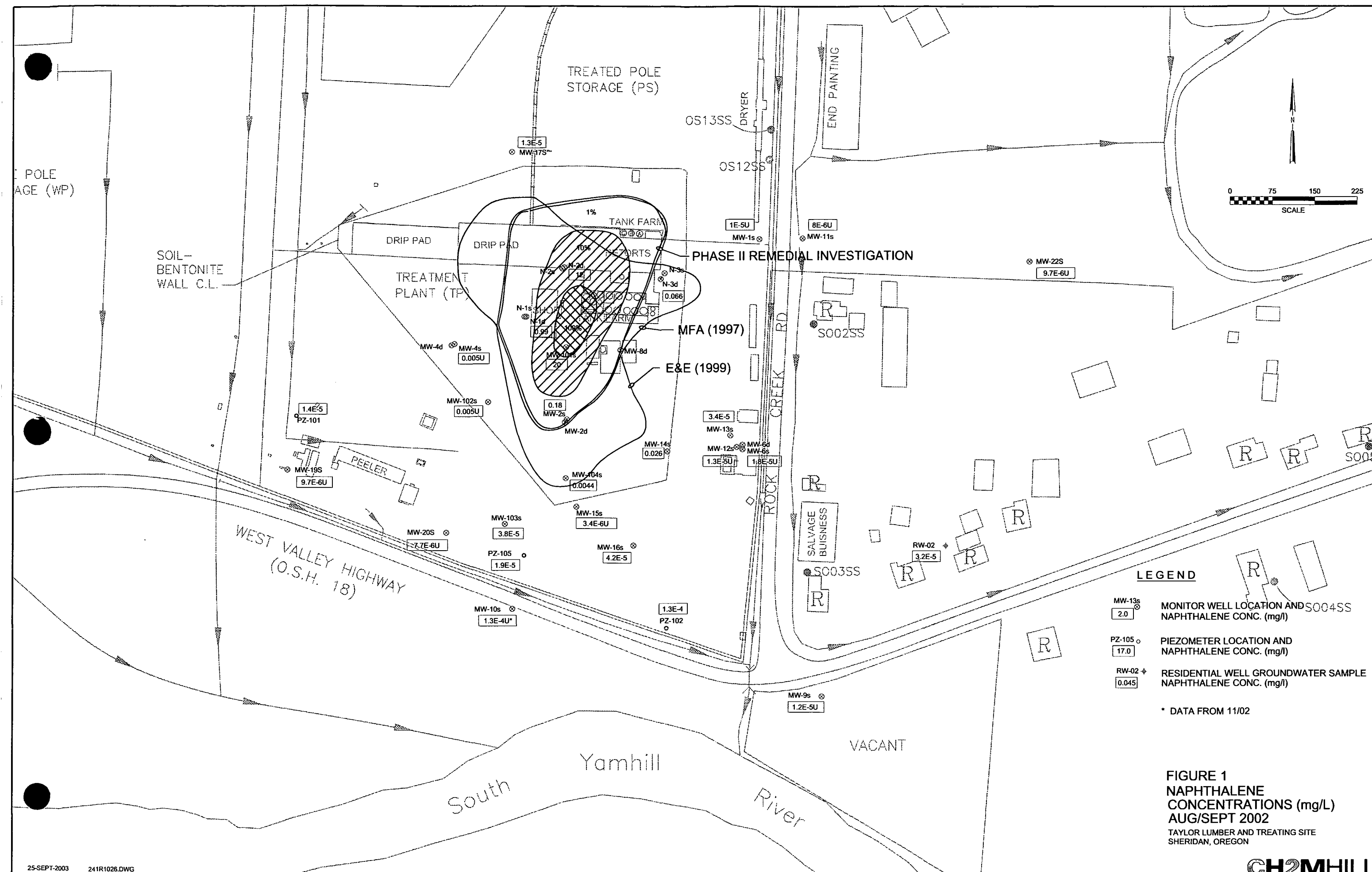


Figure 2. Aqueous Concentration Trends (All Constituents)

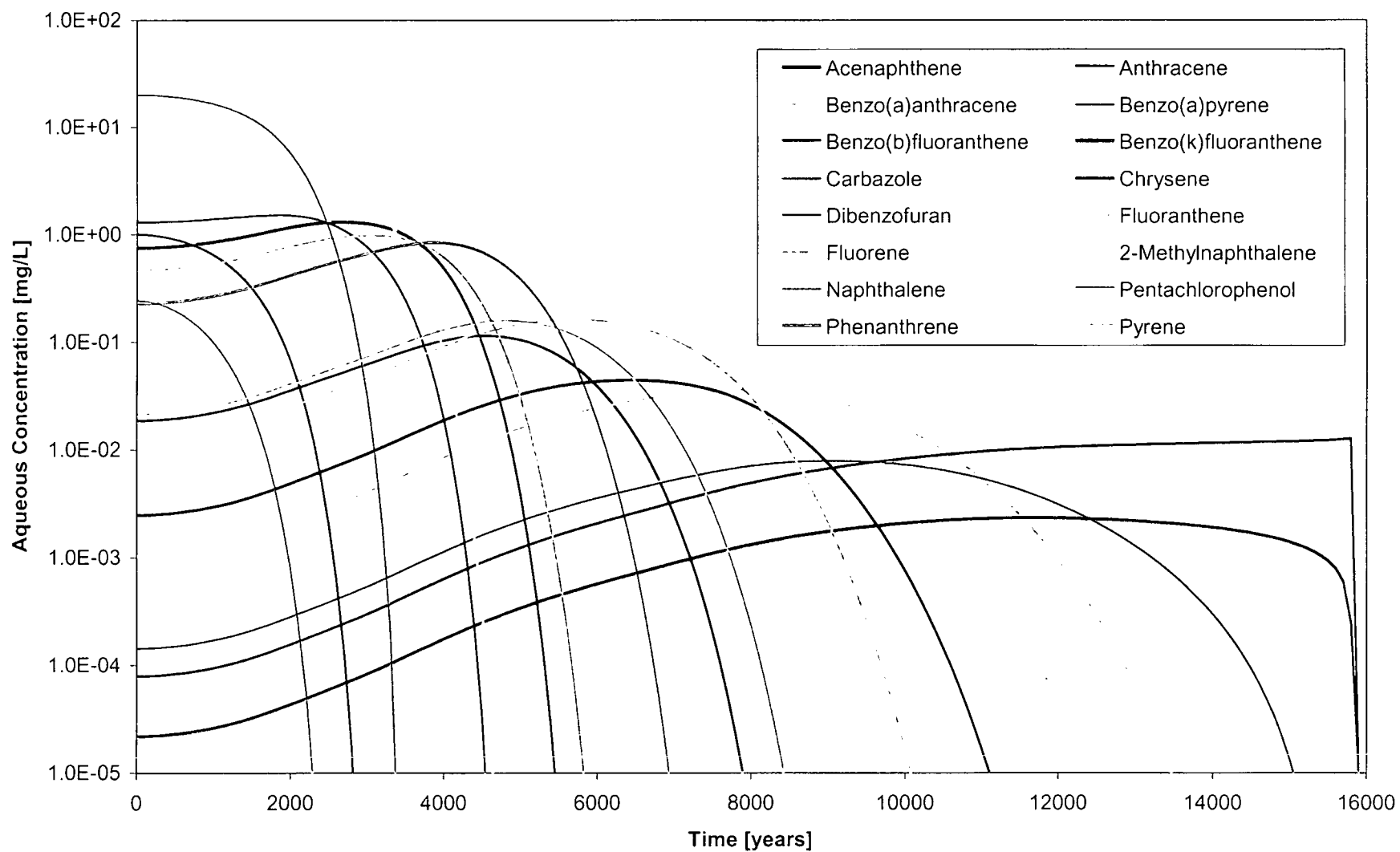


Figure 3. Risk Trends (Relative to EPA Region 9 Tapwater PRGs)

